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Evaluating the impact of peer review and participation awareness in an online collaborative document authoring environment

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**EVALUATING THE IMPACT OF PEER REVIEW AND PARTICIPATION
AWARENESS IN AN ONLINE COLLABORATIVE DOCUMENT
AUTHORING ENVIRONMENT**

By Greg Baatard

**This thesis is presented in partial fulfilment of the requirements for the degree of
Bachelor of Science (Internet Computing) with Honours**

**Faculty of Computing Health and Science
Edith Cowan University**

Supervisor: Dr Justin Brown

2006

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Abstract

Online Learning Environments (OLEs) have been widely adopted by higher education facilities, offering distance education with the potential to support the social and collaborative aspects deemed crucial to modern constructivist pedagogy. Groupware, a form of software which aims to facilitate group work, has been the subject of much research, from both educational and enterprise perspectives. This research introduced Reportal, an online groupware system designed to facilitate the collaborative authoring of a document. Reportal's peer review and participation awareness features were the focus of this research, and their impact was measured against the elements of online collaboration, a typology established by the author which reflects the factors that the literature has defined as being influential to effective online collaboration.

The findings from a multiple case study of university students using the Reportal system indicate that peer review and participation awareness features in groupware have distinct positive impacts on the elements of online collaboration. While the research was a preliminary investigation, such findings are a first step in distinguishing, refining and implementing groupware features which support collaboration in an online environment. Implementation of such features has the potential to increase the effectiveness of online collaboration in education and enterprise significantly.

Declaration

I certify that the thesis does not, to the best of my knowledge and belief:

(i) incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher degree;

(ii) contain any material previously published or written by another person except where due reference is made in the text; or

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Signed

Date __

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Chapter 1 - Introduction

1.1 - Background to the study

Universities are changing the way in which they work. The traditional objectivist pedagogy, where learners are passive participants receiving knowledge from an instructor, is proving increasingly unsuitable for the needs of today's skill-focused workplaces. Universities have begun to adopt constructivist pedagogy, drawn largely from Vygotsky's (1962; 1978) theories of social cognition, emphasising interaction and collaboration amongst peers in order to construct skills and knowledge in a way which resembles that of the workplace. In parallel to this, the ever-increasing prevalence of the World Wide Web (WWW) and busy lives of learners have seen an increasing number of universities implement Online Learning Environments (OLEs) to deliver distance education and supplement campus-based courses. Just about all universities now have some form of Web-based learning system, with some "virtual universities" offering only this option, providing learners with access to course content from anywhere and anytime (J. Clark, 2000). Constructivist pedagogy is of even greater significance in courses relying largely on an online environment, with social interaction and collaborative learning being identified as core components to achieving educational outcomes and learner satisfaction (Hiltz, Coppola, Rotter, & Turoff, 2000; Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999).

Collaborative learning requires learners to interact with each other, coordinating their efforts and constructing knowledge as a group of peers rather than as individuals directed by a facilitator. Tasks of this nature are varied, as can be the sizes of groups, from pairings and small groups to entire class collaborations. A common task, one which supports the development of real-life work skills, is that of creating a lengthy document such as a project plan or business report. This task calls for effective communication, coordination and collaboration within a small group. The collaborative nature of the task is summarised well by Clark (2000):

A group paper can be assigned to foster collaborative learning when the proper tools are available. Each student can be assigned to write a portion of the paper. They can then actively merge the sections together or appoint an editor to do the assembly.

The relevance of such a task to real-life work is emphasised by Grudin and Poltrock (1997, p. 293), who discuss the role of document management systems in the workplace:

Teams writing large documents generally divide or 'shred' documents into sections that are assigned to different authors who work in parallel, communicating with one another as necessary. Each section, and the document as a whole, may be reviewed, revised, and approved.

While providing tools such as discussion forums and support for live collaboration, OLEs are designed around the delivery of course content and related activities. These systems typically do not provide the sophistication or granularity required to manage a small group project such as the collaborative authoring of a document. Simple tools such as email or a private discussion forum can provide reasonable support for such a project, but their effectiveness is limited when it comes to prolonged or complex tasks, especially those where group members do not have the opportunity for face-to-face contact (Bannon, 1995; Bentley, Horstmann, Sikkel, & Trevor, 1995; J. Clark, 2000). Groupware, software systems designed specifically to coordinate and support the activities of groups, provides learners with the sophisticated tools and centralisation required to manage complex collaborative projects effectively. The term groupware also covers organisation-wide infrastructure-reliant systems used in workplaces, such as Lotus Notes, however the context of this research is the task-oriented, Web-based form of groupware which includes systems such as Basic Support for Cooperative Work (BSCW) (Fraunhofer FIT, 2005). Systems such as these provide a high degree of support for group-based tasks or projects, providing a centralised, online set of tools and features specific to the task at hand (Bentley, Horstmann, Sikkel, & Trevor, 1995).

This research introduced Reportal (Figure 1.1), an online groupware system designed to facilitate the collaborative authoring of a document. Developed for students undertaking such a task as part of their university studies, Reportal can be used to supplement the face-to-face activities of campus-based learners or as the sole point of contact for distance learners. Reportal allows the sections of a structured document to be defined and assigned to group members, who each have a personal workspace (Figure 1.2) from which they can complete their assigned sections before submitting them to the main document. Other supporting features include areas to store and share drafts and notes, asynchronous communication tools, and document management tools.

In discussing the findings of studies of collaborative writing, Dourish and Bellotti (1992) state that “information sharing, knowledge of group and individual activity, and coordination are central to successful collaboration”, identifying them as “critical concerns in the design of computer systems to support collaborative writing.” It is upon these principals that Reportal has been designed. Reportal is used entirely online, accessed via a standard Web browser.

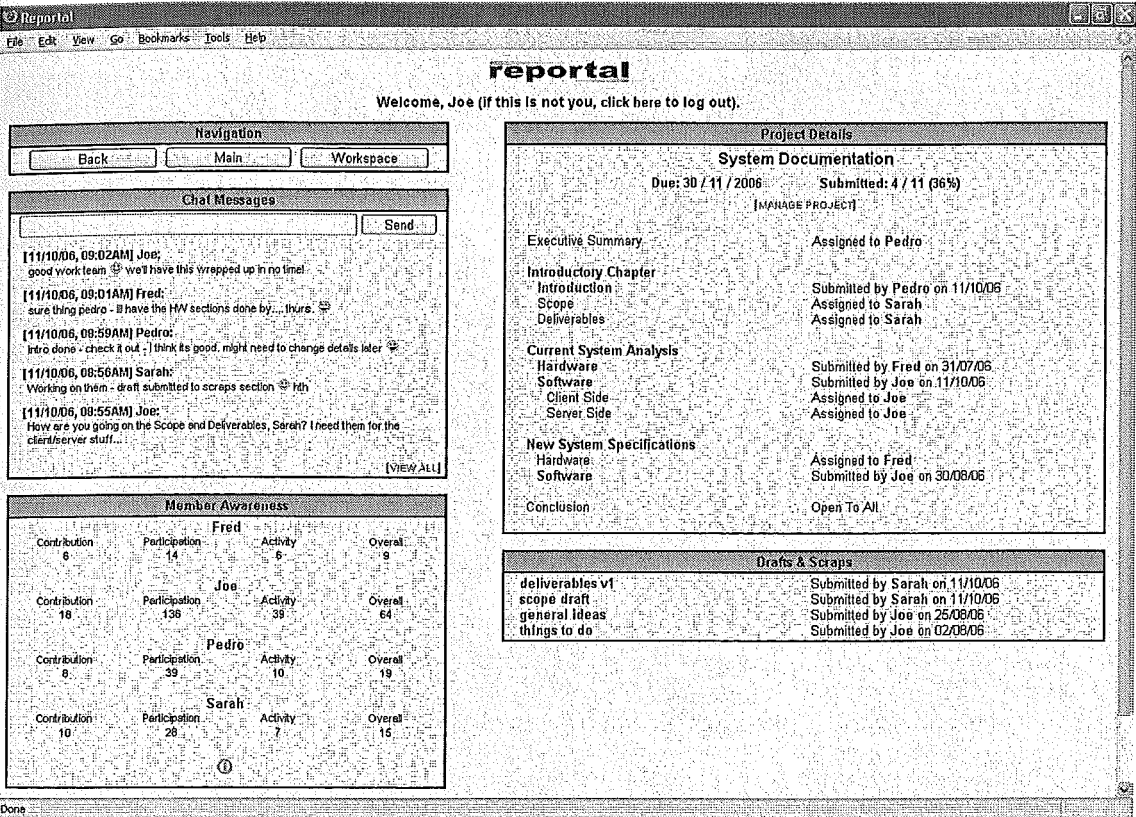


Figure 1.1 - Reportal Screenshot: Main Page (Includes Participation Awareness in form of "Member Awareness" area)

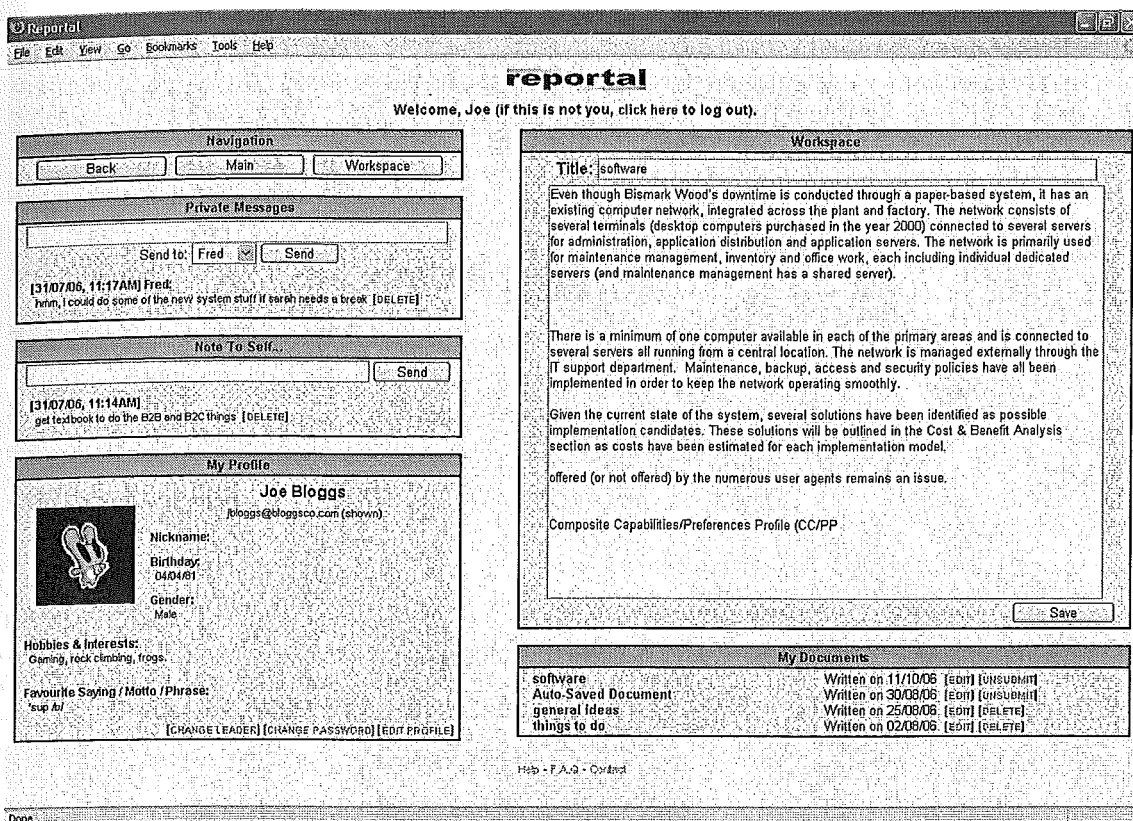


Figure 1.2 - Reportal Screenshot: Workspace Page

Research has shown that groupware, like OLEs, has the potential to improve educational and workplace outcomes significantly, once again identifying collaboration and social presence as essential (Duffy, 1996; Hall, 1999; Mandviwalla & Olfman, 1994). An emphasis is placed on the development of trust and a sense of community within groups, recognising them as important elements of effective collaboration (Bjørn, Fitzgerald, & Scopula, 2003; Hughes, Wickersham, Ryan-Jones, & Smith, 2002). While many studies have observed these elements and the impact they have on the success of a project, little has been done to identify the influence that specific features of groupware systems have on these elements. Asynchronous communication, such as that experienced in online discussion forums, has been found to support collaborative learning by allowing participants to scaffold their knowledge by reflecting on and sharing information with their peers (Beasley & Smyth, 2004; Brown, 1997; Vonderwell, 2003). Awareness mechanisms in groupware serve to inform users of the actions of other users, helping to establish social presence and facilitating collaboration (Dourish & Bellotti, 1992; Kirsch-Pinheiro, De Lima, & Borges, 2003). While relevant, asynchronous communication and basic awareness mechanisms are generic features of groupware, without which it could hardly support group work, making it unsurprising

that these features have been found to support collaboration. This research evaluated the impacts of two novel features of Reportal, those of participation awareness and peer review.

1.2 - Statement of research questions

The primary research question of the research was:

“What impact do peer review and participation awareness have in an online collaborative document authoring environment?”

Participation awareness is a feature born from Reportal's higher education setting, where the issue of individual participation in group tasks is important. The participation awareness mechanisms in Reportal build a set of data for each member of the team, tracking activity and participation within the system. Data is drawn from statistics including number of logins, document, note and draft contributions, and the viewing and acknowledgement of other members' contributions. By including more than raw contribution statistics, the data reflects indirect participation such as reading the submissions of others and staying in contact with the group (Borges & Pino, 1999). A summary of the current data is prominently displayed on the main page of the system (Figure 1.1), giving all users an up-to-date representation of how actively all team members are participating in the project. Peer review in Reportal regards the ability to comment and rate the submissions of other team members (Figure 1.3). This is not a formal or mandatory process, but one which has the potential to have a significant impact on the social and working dynamics of the group, and ultimately on how well its members perform overall.

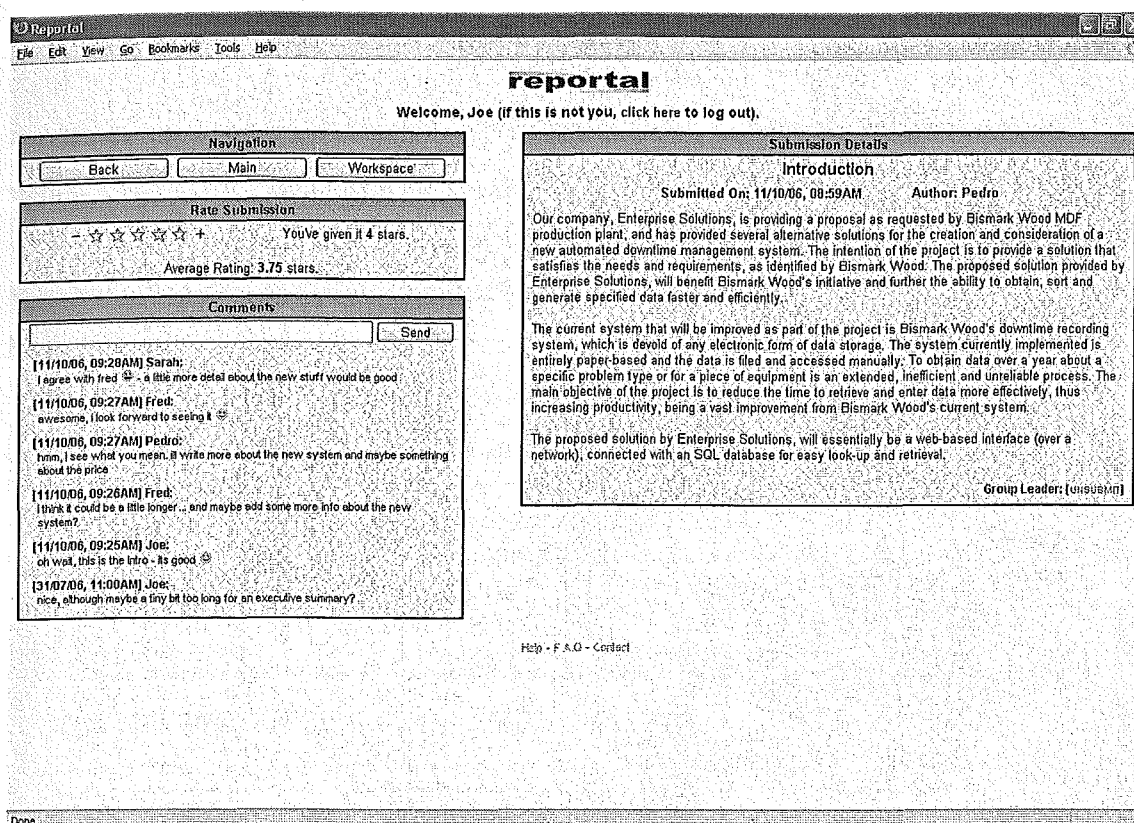


Figure 1.3 - Reportal Screenshot: Submission Viewing and Peer Review Page

In order to evaluate the impacts of the two features independently, two subsidiary questions were defined:

Subsidiary Question #1

"To what extent does participation awareness influence the elements of online collaboration?"

Subsidiary Question #2

"To what extent does peer review influence the elements of online collaboration?"

As the literature has repeatedly identified collaborative learning as the core component in realising the potential of OLEs and groupware, collaboration is a suitable attribute from which to evaluate the impact of participation awareness and peer review. The "elements of online collaboration" is a typology established by the author which reflects the factors that the literature has defined as being influential to effective online collaboration, stipulating that the presence of these elements support and facilitate collaboration in an online environment. The elements are many, however primary

elements include trust, the sharing of knowledge, social presence and effective communication. The elements are heavily interrelated and it cannot be said that they are defined precursors or components of collaboration. Hence the ultimate element of online collaboration is collaborative activity itself, such as evaluated by Curtis and Lawson (2001). The typology is not intended to provide an explicit structure to be adhered to when evaluating the impact of groupware features. It is a guide, intended to focus the research and ensure the impacts of groupware features are evaluated in a way which is relevant to the effectiveness of the environment. Figure 1.4 illustrates the current form of the typology, which is still in development.

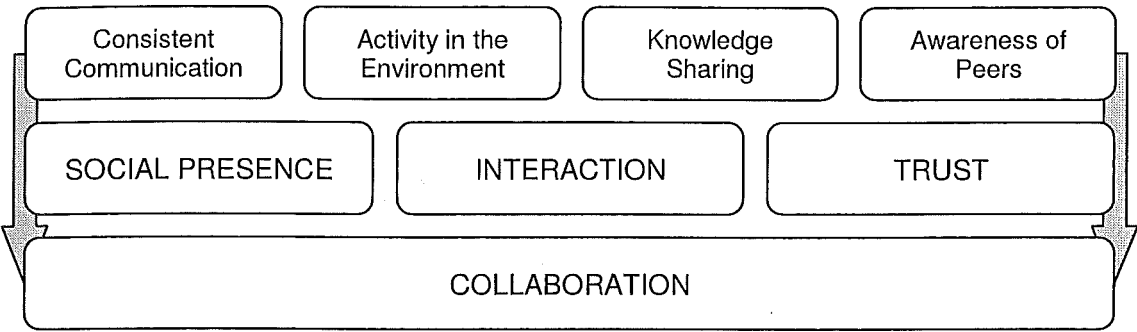


Figure 1.4 - The Elements of Online Collaboration, a typology in development

Elements appearing at the top of the diagram represent components often seen to contribute towards larger elements appearing towards the bottom. However, it is important to remember that the elements are heavily interrelated, so it is not possible to define distinct relationships and boundaries.

1.3 - Significance of the research

Reportal introduced two features which have not been the focus of substantial previous research in this field. The implementation of participation awareness is novel in that it aimed to provide an objective measure of direct and indirect participation over the long term. It was expected that interpretation of this feature by users would be influenced by the social dynamic of the group, and in turn become an influence on that dynamic. Peer review, an established concept in education, also has the potential to impact the group dynamic in an online environment, such interaction by peers often testing trust, community and social presence (McLaughlin & Simpson, 2004). While the research evaluated the impact of the features from the perspective of online collaboration in

education, the impact of such mechanisms could also be analysed in relevance to social sciences and other areas. This research is a preliminary investigation into the impact of the features. It is predicted that the results of this research will provide a basis for further research which may have a significant impact on future collaborative systems, particularly those where collaboration takes place in an online environment.

Remembering the context of university education in which Reportal resides and the importance of collaborative learning to the success of OLEs, findings of this research may benefit students. At a practical level, Reportal serves as a framework for further development of a collaborative document authoring system which might be implemented in higher education facilities, providing learners with an appropriate and effective support tool for this type of collaboration. The theoretical findings build upon a framework for further research into the features of OLEs, features which have the potential to influence the educational outcomes and satisfaction of learners by supporting the elements of collaboration crucial in such environments. Participation awareness and peer review are concerned with collaboration and communication amongst learners, placing the features in line with the constructivist pedagogy applied in modern universities.

Chapter 2 - Literature Review

The areas of Computer-Supported Collaborative Learning (CSCL) and the use of Computer-Supported Cooperative/Collaborative Work (CSCW) were the principal areas from which supporting literature was sought. These two areas encapsulate this research well, with CSCL providing the context of higher education in an online environment, and CSCW involving groups working collaboratively online. This literature review will outline the core attributes of CSCL and CSCW environments, their position within educational facilities and enterprise, their impacts and desired outcomes, and details of the facets and features relevant to this research.

It is worth noting that CSCL and CSCW are often intermixed (Hughes, Wickersham, Ryan-Jones, & Smith, 2002; Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999), with many OLEs fitting the definition of groupware, and a number of fundamental tenets are applicable to both areas. As stated above, the distinction largely lies in the environment, with CSCL systems appearing primarily in education and CSCW systems often aimed at enterprise or generic group-based work. Sections of this literature review which concern topics most commonly explored in the context of CSCL will refer to users as learners or students, while those concerning topics usually explored in the context of CSCW will refer to users as group or team members.

2.1 - Computer-Supported Collaborative Learning

CSCL is a broad label typically applied to the use of course content delivery software employed by educational facilities, such as OLEs. This software comes under a multitude of other names, including Asynchronous Learning Networks (ALNs), Learning Management Systems (LMSs) and Collaborative Virtual Environments (CVEs). Early OLEs followed the traditional, objectivist, instructor-central model of education, where the learner is largely a passive receiver of information (J. Clark, 2000). These systems provided little more than online lectures, simply moving the existing pedagogy online without realising the benefits of a WWW enabled computer environment and often requiring learners to log in at specific times in order to receive a text-based lecture (Alavi, 1994; Hao, 2004; Hiltz & Benbunan-Fich, 1997; Markel, 2001).

Modern OLEs take a constructivist approach to education, emphasising interaction, reflection and feedback between learners, instructors and resources. Resources such as images, animations, videos, quizzes and hyperlinked documents supplement the course content, taking advantage of the computerised environment. These systems are often entirely Web-based, providing anytime, anywhere access to learners and instructors, a feature which is of key importance to distance learners (Hao, 2004; Hiltz & Benbunan-Fich, 1997). Discussion between students and instructors is facilitated by synchronous (e.g. real-time chat) and asynchronous (e.g. threaded discussion forums) communication tools, focusing on discussion between students to explore and reflect upon the course content further; constructing knowledge in a collaborative social context (Palloff & Pratt, 1999). Modern OLEs such as Blackboard and WebCT further support collaboration with tools such as virtual classrooms and shared whiteboards, as well as providing single-user support via tools such as calendars and grade tracking.

With the large majority of universities offering some form of online or distance study and an increasing number of “virtual universities” offering online study exclusively, OLEs have become increasingly commonplace within higher education (Handy, 1995; Kariya, 2003; Whittington & Sclater, 1998). Also used to supplement campus-based courses, the use of OLEs has the potential to be just as good as, or even better than, traditional classroom learning (Hiltz, Coppola, Rotter, & Turoff, 2000). Technologies only available in an online environment, when combined with a constructivist pedagogy, permit learners to interact with their peers, scaffold their knowledge and to explore course content in greater depth (Vonderwell, 2003).

2.2 - Collaborative learning

Collaborative learning has been recognised as a core component in realising the benefits of OLEs (Hiltz, Coppola, Rotter, & Turoff, 2000; Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999). Vygotsky’s (1978) theories of social cognition and constructivist pedagogy provide a sound framework for collaboration in education, which is strengthened by the need to replace the social interaction often lost in an online environment. Multiple studies have found that learners working in groups online perform better and are more motivated than those working alone, sometimes outperforming their collaborative face-to-face counterparts (Bahli & Büyükkurt, 2005;

Barab, Thomas, & Merrill, 2001; Brown, 1997; M. S. Cohen & Ellis, 2002; Oliver, 2001; Scott, 2002; Treleaven, 2003). Realising the potential benefits of OLEs requires instructors to adapt to the online environment, taking on a “guide on the side” role rather than the traditional “sage on the stage” in order to encourage interaction between learners during online discussion (T. Clark, 2003; Hiltz & Benbunan-Fich, 1997; Suler, 2004). The design of course content and assessments must also be adapted. Assessable collaborative tasks can help to realise the benefits of constructivist pedagogy, but they must be implemented in a fashion which is supported and accepted by both the environment and learners (Bannon, 1995; Beasley & Smyth, 2004; J. Clark, 2000; Goodell & Yusko, 2005). Establishing a sense of social presence and community through discussion and collaboration amongst peers reduces the feelings of isolation and dehumanisation often encountered in OLEs, encouraging further participation and enthusiasm which ultimately results in better learning and lower dropout rates (Barab, Thomas, & Merrill, 2001; M. Fisher & Baird, 2005; Goodell & Yusko, 2005; Hughes, Wickersham, Ryan-Jones, & Smith, 2002; Rovai, 2002).

While collaborative tasks and activities are something which must be consciously implemented and enforced by the instructor in OLEs designed for course content delivery, Reportal serves to facilitate a task which is inescapably collaborative in nature. While sole sections of a paper can often be written independently, communication and collaboration with group members is required in order to coordinate activities and achieve optimal results (Dwyer, Sunal, Giesen, Sunal, & Trundle, 2001; Stacey, 1999). Studies in the literature have found that groups who coordinate their efforts, interact on a social and task-related basis and share information effectively, learn better and produce higher quality work than those who do not (Dillenbourg, Baker, & O'Malley, 1996; Hiltz, Coppola, Rotter, & Turoff, 2000). As groupware, Reportal provides the centralised and sophisticated tools, lacking in common OLEs, which are required to manage a focused group-based task effectively.

2.3 - Asynchronous Communication

The large majority of OLEs, and groupware systems, rely on asynchronous communication, usually in the form of a threaded discussion forum. Much research has been done into the effectiveness and impact of asynchronous discussion in collaborative

learning and working environments. Asynchronous communication in OLEs is a valuable resource for learners, allowing them to explore the course content as a group, asking questions, sharing resources and learning with their peers (Brown, 1997; Nunamaker, Dennis, Valacich, Vogel, & George, 1991; Rico & Cohen, 2005). Learners may take time to reflect upon postings and formulate a reply with greater depth, something which is not normally possible in real-time (synchronous) communication (Beasley & Smyth, 2004; Schwier & Balbar, 2002; Vonderwell, 2003). Asynchronous online discussion also has the ability to level the playing field, giving learners who may be shy and quiet in a face-to-face setting an equal voice online, as well as minimising the impact of characteristics such as age, gender, accent and nationality (Brown, 1997; T. Clark, 2003; Hughes, Wickersham, Ryan-Jones, & Smith, 2002; Suler, 2004).

Asynchronous discussion is not without its drawbacks. Text is a thin medium (Curtis & Lawson, 2001; Daft & Lengel, 1986), lacking in many of the attributes of face-to-face communication such as tone, facial expression and hand gestures. This can lead to misunderstandings if care is not taken to phrase text-based messages clearly (Sclater, Grierson, Ion, & MacGregor, 2001; Vonderwell, 2003). An asynchronous discussion also takes place at a much slower pace, often with a day or more elapsing before a participant checks the system and posts a reply. This can cause anxiety and stress (Allan & Lawless, 2003b, 2004), particularly if coupled with a pressing schedule or the need for a timely response. The pace of asynchronous discussion must be taken into account when designing online course delivery, as must the time and effort required to keep track of possibly dozens of discussions over a length of time. Some studies have found that while asynchronous communication can facilitate collaborative learning amongst distance learners, the nature of these communications can be problematic due to factors such as time zones, unresponsive partners and language barriers (Ragoonaden & Bordeleau, 2000; Vonderwell, 2003).

Synchronous communication such as instant messaging and live chat, while not without its benefits, is regarded by the literature to be less suitable than asynchronous communication for online collaboration (Hao, 2004; Riopelle et al., 2003). As well as requiring all participants to be present at the same time, synchronous communication is too fast-paced and unstructured to facilitate in-depth discussion and collaboration

(Schwier & Balbar, 2002), making it more suited to prompt decision making, meetings, and social discussion.

Reportal is entirely asynchronous, relying on messages posted to the system message boards for communication between team members. Messages can be posted on various areas within the system, on the main page or as comments on any submissions, as well as private messages between individuals.

2.4 - Computer-Supported Cooperative/Collaborative Work

Computer-Supported Collaborative Work is mainly based on "Groupware" which is information technology that provides the higher levels of coordination and cooperation needed to support individuals working together in organisations. (Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999)

While CSCL encompasses learning in an educational environment, CSCW tends to cover working in a business environment. Groupware in CSCW is most beneficially used by "virtual teams", work groups made up of members who are temporally and spatially separated, and it is on these groups that the literature focuses. Members of such groups may come from different branches of the same organisation, or different organisations entirely (Johnson, Heimann, & O'Neill, 2001; Knoll & Jarvenpaa, 1995). The ability to work online in virtual teams allows the most qualified team members to be selected from across the globe, rather than being limited to the best local candidate (Kimble, Alexis, & Li, 2000; Lipnack & Stamps, 1997, 2000). These teams are often formed to achieve a defined goal, or address a problem, and are dissolved upon completion of this goal (Bell & Kozlowski, 2002; Kimble, Alexis, & Li, 2000). As organisations become increasingly global, and are expected to respond quickly and efficiently to events, software to support highly interdependent online work is crucial (Johnson, Heimann, & O'Neill, 2001; Rico & Cohen, 2005). Groupware provides the sophistication lacking in simple tools such as email and discussion forums, supporting structured and organised collaboration and communication within a group.

A study by the Intelligence Community (Hall, 1999) regarding computerised collaborative environments found several key elements to successful collaboration. These included establishing trust, reaching critical mass, and having a defined common

goal and ground rules, as well as broader elements including a collaborative organisational culture, support from management and rewarding acts of collaboration. These elements are broadly applicable across most CSCW and CSCL environments, and focus on the cultural, organisational and political factors of collaborative online environments above the technical considerations.

From a technical perspective, groupware comes in two main forms. Organisation-oriented groupware strives to deliver the online communicative and collaborative needs of an entire organisation in an ongoing, permanent manner. These systems usually require substantial infrastructure support: file and database servers, middleware, and application software must be implemented and installed across the organisation. These systems provide sophisticated facilities to support collaboration and communication within an organisation, with features ranging from email management, discussion forums and instant messaging, to co-authoring, version control and workflow management (IBM, 2005). Lotus Notes and Microsoft Exchange are examples of this type of groupware. The broad scope, significant infrastructural requirements and local software dependence of these systems places them in a rather different category than an online system such as Reportal (Collins & Berge, 1996).

The second form of groupware, which includes Reportal, exists entirely online and serves to achieve a certain collaborative task, be it authoring a document, building a Web site, or designing a house (Appelt & Birlinghoven, 2001; Guzdial, Rick, & Kerimbaev, 2000). While not as sophisticated or integrated as organisation-oriented groupware, specialised online groupware offers an environment which is focused on a task, available anywhere and anytime and is often platform independent, usually at a much lower cost. Some groupware systems combine aspects of the two types. For example, BSCW provides a wholly online shared working environment, supporting file management, synchronous and asynchronous communication tools, calendaring, and other generic tools to assist collaboration. Fully online generic groupware systems such as BSCW have become increasingly common.

2.5 - Trust, Social Presence and Community

Much of the research in virtual teams and groupware usage relates to the impact that such an environment has on the development of trust within a team. While traditional teams frequently meet face-to-face, virtual teams often never meet in person. Also, the nature of virtual teams is such that members have often had no prior interaction with each other and no expectation of future interaction once their goal has been achieved (S. Cohen & Gibson, 2003; Knoll & Jarvenpaa, 1995).

The concept of swift trust (Hall, 1999; Meyerson, Weick, & Kramer, 1996) is often cited in research into virtual teams. Swift trust is a term used to describe the trust that forms in teams which are established on demand to achieve a defined goal. Such temporary teams are characterised by operating under a tight schedule with little time for relationship building and/or a limited or non-existent history of working together in the past (S. Cohen & Gibson, 2003). Under such constraints, team members draw on past experience, first impressions and stereotypes to form a tentative initial trust. This impression is quickly enforced or changed by the initial interactions of the team, with active and enthusiastic teams typically leading to a higher degree of trust.

In virtual teams, swift trust is established during the initial interactions of team members; the contents of a user profile, the first few forum posts or the preliminary live chat session. Good, and bad, first impressions can set the tone of team trust and communication throughout the project, with bad first impressions being difficult to correct in an online environment where social interaction is limited. Demonstrating excitement, commitment and enthusiasm and providing feedback on team members' work have been found to aid the development of trust (Stohr & Peterson, 1999). While computer mediated communication (CMC) may hinder some elements of trust and relationship building such as non-verbal cues, it can assist in the development of swift trust. Cultural differences such as dress and accent which can lead to a negative initial impression in face-to-face groups are largely irrelevant in virtual teams (S. Cohen & Gibson, 2003; Jarvenpaa & Leidner, 1999; Stohr & Peterson, 1999).

Closely linked to trust are social presence and a sense of community. It is easy for team members to feel isolated by the spatial or temporal distance and the somewhat cold computer medium, typically leading to a decrease in motivation, effective collaboration

and communication (M. Fisher & Baird, 2005; Northrup, 2001; Rovai, 2002). While an initial or regular face-to-face meeting has often been suggested as a means to facilitate the social aspects of virtual teams (Gould, 1998; Murphy, Mahoney, & Harvell, 2000), this is often an inconvenient and costly exercise. Critics have pointed out that requiring same time, same place interaction goes against the “anywhere, anytime” ethos of CSCW and CSCL (Hughes, Wickersham, Ryan-Jones, & Smith, 2002). Social presence has been recognised as an important factor of constructivist learning, with Garrison, Anderson and Archer (2000) placing it alongside cognitive presence and teaching presence as “crucial prerequisites for a successful higher educational experience.” Garrison et al. (2000) define social presence as the ability of learners to project their personality and emotions through the communication medium, insisting that this is possible in a computer mediated environment, but effort is required to replace the richness of face-to-face interaction.

Work teams, or groups of learners, in online environments who develop a strong sense of community and social presence are more likely to be successful and achieve higher satisfaction (Gunawardena & Zittle, 1997; Holton, 2001; Kreijns, Kirschner, & Jochems, 2002). Trust deepens as relationships between team members and class mates grow on a social level, making collaborative activities more appealing and productive (S. Cohen & Gibson, 2003; Conrad, 2005). Trust, social presence and community become increasingly important to the success of long term online collaborative teams, with those who do not establish a comfortable social dynamic usually performing badly over extended periods of time (Conrad, 2002; Rovai, 2002).

A common feature in OLEs and groupware systems is that of a public user biography or profile. This gives users the opportunity to share some “human” information such as their background, interests and hobbies, sometimes including a photograph or graphical avatar. Support for such a feature is widely recommended in the literature (Allan & Lawless, 2003a; Barab, Thomas, & Merrill, 2001; J. Clark, 2000; K. Fisher, Phelps, & Ellis, 2000); the feature stimulates the development of trust, community and social presence within online environments. Public profiles are supported in Reportal, as are other features found to foster social presence such as the use of emoticons to add tone to text-based messages (Figure 2.1).

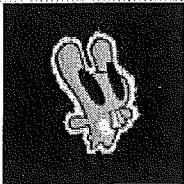
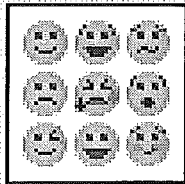
Member Details		
Joe Bloggs		
jbloggs@bloggsco.com		
	Nickname:	Jo-Blo
	Birthday:	04/04/81
	Gender:	Male
		
Hobbies & Interests:		
Gaming, rock climbing, frogs.		
Lately I've been into sudoku puzzles too, but don't tell anyone about my secret addiction 😊		
Favourite Saying / Motto / Phrase:		
"Give a man a fire and he's warm for the day. But set fire to him and he's warm for the rest of his life." (Terry Pratchett)		

Figure 2.1 - Reportal Public Profile and Emoticon box-out

2.6 - Participation Awareness

Kirsch-Pinheiro, De Lima and Borges (2003, p. 50), citing Dias and Borges, describe four types of support necessary for achieving harmony and understanding in online groups:

- (1) communication among the participants;
- (2) coordination of their activities;
- (3) a "group memory", which records the group's common knowledge, such as the interaction between the participants and the products developed by them;
- and (4) awareness support.

Typically supported in CSCW groupware, where effective coordination is vital, awareness pertains to the concept of being aware of other team members' past, present and sometimes future actions in the system. The benefits of awareness in groupware are manifold: it supports collaboration, decreases feelings of isolation, promotes a more natural working environment, reduces the risk of double-work and integration errors, and can add to a groups' shared knowledge (Borges, Pino, & Valle, 2001; Dourish & Bellotti, 1992; Kirsch-Pinheiro, De Lima, & Borges, 2003).

Much of the research into awareness in CSCW systems relates to providing up-to-the-minute information on other team members' activities, for the facilitation of direct collaboration (Borges & Pino, 1999; Dourish & Bellotti, 1992; Gutwin, Stark, & Greenberg, 1995; Schlichter, Koch, & Xu, 1998). In many groupware systems where synchronous or near-synchronous collaboration is intended, this up-to-the-minute

information is essential to coordinate the actions of users. The participation awareness mechanisms in Reportal do not aim to facilitate direct collaboration. By tracking and processing the actions of users on the system, Reportal displays a representation of how active and involved team members have been overall, rather than what they are doing at the moment. This provides a context for the activities of users and supports social awareness, important factors in ensuring effective collaboration (Bjørn, Fitzgerald, & Scopula, 2003; Borges & Pino, 1999; Dourish & Bellotti, 1992).

This research focused on measuring the impact that this type of participation awareness had on collaboration and the social dynamic within a team. Several studies of awareness mechanisms have briefly discussed this, mentioning the importance of acknowledging the work of individuals within the team and recognising that participation includes more than contribution alone (Borges, Pino, & Valle, 2001; Ogata & Yano, 1998). Borges and Pino (1999) developed a “participameter”, which displayed a graphical summary of individual team member participation to team coordinators. It measured passive participation, such as reading the contributions of others, as well as direct contribution to determine overall participation. The paper explored the use of this tool and a contribution meter in providing coordinators with a way to detect disharmony, alienation or loosely coupled activities in a group. The paper also mentioned the ways in which team members can respond undesirably to the display or knowledge of activity monitoring by attempting to game the system, for example by remaining logged in while not working, or logging in repeatedly.

The area of awareness also encompasses team-oriented issues such as group memory and a shared collection of knowledge, features which further support group work by recording interaction and pooling relevant knowledge for collective use (Borges, Pino, & Valle, 2001; Kirsch-Pinheiro, De Lima, & Borges, 2003; Schlichter, Koch, & Xu, 1998). While the participation awareness mechanisms on which this research was focused do not provide a group memory or aim to further groups’ shared knowledge, it is worth noting that such forms of awareness are implemented in the Reportal system.

2.7 - Peer Review

Rather than simply providing students with knowledge of a certain area, today's society has prompted universities to shift towards complementing content with problem solving skills and professionalism, giving learning a real-life context (Dochy, Segers, & Sluijsmans, 1999). Constructivist pedagogy and collaborative learning support this ethos, providing learners with opportunities to interact, share and build knowledge amongst peers in a realistic fashion (Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999). As these themes become increasingly present in higher education, the concept of peer review becomes more relevant.

The benefits of peer review in traditional education have been recognised for some time (Sluijsmans, Brand-Gruwel, van Merriënboer, & Bastiaens, 2002; Topping, 1998). Interaction amongst peers is crucial to collaborative learning and social cognition theories (Vygotsky, 1978), with peer review offering extra opportunities for learners to reflect upon and critically analyse information (Topping, 1998). Peer review makes assessment more of a learning process than traditional teacher-only models, helping students to plan their learning, identify strengths and weaknesses and develop their skills (McLaughlin & Simpson, 2004). In certain circumstances peer review can have unwanted effects, such as collusive marking, where students take a "you scratch my back and I'll scratch yours" approach; other common issues include bias or inaccurate marking (McLaughlin & Simpson, 2004).

While this literature review found little in the way of research into the impacts of peer review in CSCL or CSCW environments, the relevant studies indicate that many of the benefits recognised in traditional education exist in online environments, supporting the principals of constructivist pedagogy, collaborative learning, and effective online distance education (Fahy, 2003; Hiltz & Benbunan-Fich, 1997; McGourty, Dominick, & Reilly, 1998; Vonderwell, 2003). Writing in support of collaborative learning environments, McGourty, Dominick and Reilly (1998) say that "students themselves are often in the best position to provide one another with meaningful feedback regarding both their technical and interpersonal performance." Despite a lack of empirical research, the value of peer-to-peer student support is recognised by Fahy (2003), who found such interaction allows students more independence from an instructor, assists students in building and reflecting on each other's knowledge, and decreases feelings of

isolation and depersonalisation in online educational environments. As covered in section 2.2, collaborative learning is central to realising the benefits of OLEs. This implies a focus on peer-to-peer interaction, including peer review (Kemm, Williams, Kavnoudias, Fritze, & Weaver, 2001).

Reportal implements peer review by providing the ability to comment on, and rate, the submissions of other team members. The impact of peer review within small groups has been explored to some extent, with Topping's (1998) review of the literature finding that such a process can have beneficial effects, enhancing communication and cooperation within the group and inspiring members to work harder. The peer review functionality in Reportal is not a formal process like that suggested in McGourty et al. (1998), nor is it mandatory for users to comment or rate submissions. Rating of submissions is done on a scale of one to five, intended to reflect overall quality. All ratings are averaged to provide an anonymous collective view in combination with the individual comments.

2.8 - Existing Systems of Relevance

To complete this literature review, an overview of existing systems is now presented, briefly discussing the ways in which they are relevant to Reportal and this research. As previously discussed, systems such as Lotus Notes and Microsoft Exchange have limited relevance to the context of this research due to their reliance on infrastructure and organisational focus. Discussion will therefore focus on Web-based groupware.

BSCW (Fraunhofer FIT, 2005) is an online groupware system developed by OrbiTeam Software GmbH, part of Fraunhofer FIT. It provides a shared collaborative space to support group work over the WWW, requiring only a Web browser. BSCW's groupware features are generic, focused on providing a collaborative workspace, unlike the document authoring-oriented Reportal system. Many such general purpose collaborative online environments exist (Woolley, 2006). BSCW implements peer review in much the same way as Reportal, with users being able to rate and comment upon the submissions of others. While participation awareness is not implemented, contributing components, such as who has viewed submissions and the last login of a user, can be uncovered in different areas of the system. This approach is common and

not likely to have the same impact as the more prominent participation awareness implemented in Reportal. Participation awareness could be implemented in BSCW but, as the system provides generic rather than task-oriented support for collaboration, this is likely to be a meaningless or inappropriate addition.

The area of online authoring is populated by systems such as Writely (Google Inc, 2006) and Zoho Writer (AdventNet Inc, 2006), which reproduce the features of word processing software in a Web-based form. While advanced word processing features are not part of Reportal or relevant to the focus of the study, they demonstrate how much sophistication can be achieved by Web-based task-oriented systems. Both Writely and Zoho Writer provide support for document management and live collaborative editing. However they are primarily word processing applications and do not offer the communication and coordination features of common groupware systems. As these systems are not based on work within small groups, participation awareness and peer review mechanisms are largely inappropriate. Advanced word processing support would be a viable addition to future versions of Reportal.

No other system designed to facilitate small group collaboration for document creation, like Reportal, was found. It is worth noting that such a task could, to some extent, be coordinated via creative use of generic groupware features, such as file sharing and asynchronous discussion forums. A wiki (Cunningham, 2002), a system made up of interlinked Web pages which can be edited freely by all members, could also be adapted to support collaborative document creation. A generic system adapted to a specific task in this manner would lack the sophistication of a purpose-built system.

Chapter 3 - Research Methodology and Design

Employing appropriate methodology is essential in any research. The findings of research conducted using inappropriate methods for collection and analysis of data are unreliable at best (Galliers & Land, 1987). Furthermore, it is important to be aware of what can be achieved in a single piece of research. This research explored a facet of a field which had not been researched in great depth; hence results of the research are intended primarily to be proof of concept.

3.1 - Research Methods Selection Process

The timeframe of the study ruled out the longitudinal approach which may otherwise have been appropriate. An ethnographic study was excluded for this reason, with further reflection revealing that such a study might have been inappropriate, as ethnography relates primarily to observing the behaviour of people in their “social and cultural context” (Myers, 1997). The introduction of Reportal, and analysis of the impact of certain elements of the new system, did not immediately lend itself to an ethnographic study. Stacy (1999) explored the effects of CMC technology in distance education by undertaking an ethnographic study. Data was drawn from pre-usage and post-usage interviews, electronic observation, transcripts of textual content, and usage statistics of the online environment. This indicates that an ethnographic study may be appropriate for further research where the focus is not on the impact of individual features but rather on the impact of the system’s use over time and on a specific group of people.

As the research involved the introduction of a system to enhance the process of collaborative online authoring, an action research methodology was considered. Action research is typically an iterative process, going through a repeated cycle of evaluation, implementation and review in order to improve a process or solve a problem while refining a theory (Avison, Lau, Myers, & Nielsen, 1999). Apart from requiring a significantly longer timeframe than was available, the focus on improving a process or solving a problem makes action research unsuitable to achieve the stated aims of the research; measuring the impact of participation awareness and peer review on collaboration. Action research may be suitable for further research when a larger

timeframe is available and the aim of the research pertains more to the improvement of the Reportal system as a whole.

3.2 - Research Methodology

The research method employed was a multiple interpretive case study, with groups made up of two to six university student participants. Each group of participants was requested to use Reportal as the primary collaborative and communicative tool in a document authoring assignment. Traditionally a qualitative methodology, the case study has been criticised for lacking generalisability as the data gathered is narrow in scope, pertaining only to the case or cases studied. Tellis (1997), referring to the work of Yin (1994), explains that the “generalization of results, from either single or multiple designs, is made to theory and not to populations.” As the aim of this research was to determine the impact of participation awareness and peer review in online collaboration, a case study was an appropriate methodology. The research implied that these features have a measurable impact on the elements of online collaboration. An interpretive case study methodology allowed for the introduction of a new system, Reportal, and observation of participants interacting with the system while still remaining in a real-life context (Myers, 1997; Yin, 2002). The chosen methodology and inclusion of students completing assessable tasks for their own studies indicate that a field experiment may also have been suitable. Such a technique was considered, but not used largely due to the added complexity of establishing a control group in the given environment. The live environment and context of the study lends weight to the findings of this research.

With a multiple case study as the primary methodology, data was gathered via several sub-methods, including survey and usage data analysis. Pre-usage and post-usage questionnaires of participants formed the main sources of data. The pre-usage questionnaire was the shorter of the two and centred on gathering information about the participants’ experience with OLEs or groupware, their usage of the Internet, and their previous experiences with group work situations. The post-usage questionnaire was the primary data source in the research. It was conducted at the end of the usage period, and focused on the perceived impact of participation awareness and peer review on the elements of collaboration within Reportal. General questions regarding the system as a whole, such as interface design, functionality and ease of use, were also included.

Participants were encouraged to supplement their responses to quantitative questions with open-ended textual responses.

Further data was obtained in the form of usage statistics and logs on the Reportal system. Usage statistics provided group-based overviews of activity within the system, and logs were generated to record user actions. This data was used to strengthen and support the findings of the questionnaire analysis. In this sense, the usage statistics and logs can be seen as providing context and adding to the richness of the primary data, despite being primarily quantitative in nature. Participants drawn from one unit were required, as part of the unit, to write a short reflection on their learning, which included their thoughts regarding Reportal. These reflections were used to supplement and support findings drawn from analysis of the primary data sources. The chosen methodology and techniques support Muirhead's (2000) suggestions for "content analysis of textual material" and "case studies on what factors promote interaction within group activities" as possible future research regarding interaction in computer-mediated distance education.

The use of multiple methods to validate and reinforce findings adheres to the highly recognised need for data triangulation. When used in isolation, both quantitative and qualitative methods have weaknesses. These can be compensated for by using both types of methods in conjunction (Steckler, McLeroy, Goodman, Bird, & McCormick, 1992). This research used primarily quantitative data in the form of questionnaire responses. By supporting this with qualitative data from document and text analysis and open-ended survey questions, findings were validated in a process described by Jick (1979, p. 602) as "convergent validation", reducing the possibility of inaccurate results caused by relying on a single type or source of data. The usage of multiple groups in the case study further served to triangulate findings and obtain results which are more generalisable.

3.3 - Research Design

In order to obtain participants, an email was sent by the supervisor of this research to course coordinators responsible for administering and lecturing in units which were likely to involve group-based document authoring as a first assignment. Such units,

often concerned with project management, were seen to provide an appropriate environment to conduct the research as the first assignment typically requires the creation of a project scope or proposal by a small group. Groups regularly consist of students who have no prior experience of working together, and little plan to continue doing so once the assignment is complete, much like the virtual teams encountered in the workplace. Experience shows that the task is indeed achieved in the “divide, assign and conquer” manner described by Clark (2000). While the final product of such units tends to be the production of a lengthier document such as a complete project plan or report, the initial assignment is normally due for submission early in the unit, placing it in a timeframe suitable for this research. Furthermore, attaining sustained student participation throughout the unit was deemed inappropriately intrusive given the preliminary nature of the research.

Two responses to the canvassing email were received and followed up with a visit to the units. Potential student participants were informed of the aims and methods of the research and their participation was requested. It was made clear that participation was strictly voluntary and could be discontinued at any time. Students were also assured that their participation, or lack thereof, would have no impact on their grades, and that any data collected would be anonymous and confidential. This information was also provided in written form (Appendix A). As Reportal is a system designed to support collaborative document authoring, it was presented as such and offered as a tool to assist students, rather than a burden in the name of research. A brief explanation and demonstration of the system was conducted, outlining the core features.

Basic demographic and contact details were obtained from students wishing to participate in the research (Appendix B), who were then asked to complete the pre-usage questionnaire. As the participants were drawn from students undertaking actual coursework, creating groups and assigning tasks to complete was not within the scope of the research. Groups were formed by the unit lecturer or amongst students themselves, and they worked to achieve the requirements of their assignments. One of the units contained students studying entirely online. Email was used to contact online participants regarding their groups and provide an overview of Reportal. A copy of this email can be found in Appendix C.

Data contributing to the usage statistics was gathered automatically by Reportal over the usage period. Logs of user actions were also generated automatically and stored in the database backend of the system. The timeframe of the research allowed up to one month to collect data, with the final copy of data generated by Reportal taken at the end of the fourth week. While usage data was not to be collected after this period, participants were informed that they might continue to use the system until the end of semester if they found it beneficial to their studies. At the end of the usage period, the post-usage questionnaire was made available, electronically, to all participants. Follow-up visits to the units were made to request the completion of the post-usage questionnaire and address any questions regarding the system or research.

The research design and methodology provided a sufficient amount of quality data. As previously stated, quantitative questionnaire data formed the primary data source, with findings being triangulated by data from Reportal, qualitative questionnaire responses and participant reflections. Analysis of the data achieved the aims of the research; to evaluate the impact of participation awareness and peer review in a collaborative online document authoring system.

Chapter 4 - Analysis and Discussion

4.1 - Data Analysis

Participation in the research consisted of completing a pre-usage questionnaire, using Reportal in small groups for a number of weeks, and then completing a post-usage questionnaire. Statistics and logs were gathered from all groups during usage of the system, and were used to identify group-based trends and triangulate findings (Jick, 1979; Steckler, McLeroy, Goodman, Bird, & McCormick, 1992). Logs, Figure 4.1, were generated by all user actions within Reportal, such as posting a comment or submitting a document. Usage statistics, Figure 4.2, recorded the number of several key indicators of activity, such as logins, submissions and chat messages.

uLog_id	time	member_id	clearance	details
30	20060809103953	2	leader	Login
31	20060809104840	2	leader	Chat Message Posted [ID: 2]
32	20060809105242	2	leader	Document Saved [ID: 3]
33	20060809105340	2	leader	Document Updated [ID: 3]
34	20060809105356	2	leader	Document Submitted [ID: 3 TYPE: draft]
35	20060809110238	2	leader	Chat Message Posted [ID: 3]
36	20060809110316	2	leader	Logout
37	20060809165433	1	member	Login
38	20060809171043	1	member	Comment Posted [ID: 1]
39	20060809185822	1	member	Logout
40	20060809200706	3	member	Login
41	20060809201003	3	member	Password Changed
42	20060809201205	3	member	Profile Updated
43	20060809201559	3	member	Chat Message Posted [ID: 4]
44	20060809201948	3	member	Chat Message Posted [ID: 5]

Figure 4.1 - Database view of Reportal logs

Group 15, 3 active members							
Participant ID	Logins	Chats Posted	Documents Submitted	Comments Posted	Ratings Made	Private Messages Sent	Overall Average
47	57	23	7	2	2	6	53%
57	29	13	3	1	1	1	23%
29	31	14	7	1	0	2	24%
Totals:	117	50	17	4	3	9	

Figure 4.2 - Spreadsheet view of Reportal usage statistics

A total of 85 students completed the pre-usage questionnaire, and 65 completed the post-usage questionnaire. Of these, 59 completed all parts of the research to provide a complete set of data, referred to as “participants” in this analysis. Only complete sets of

data were kept for analysis. Dropouts were attributed to late enrolments or withdrawals from the units, students who discontinued participation in the research, and participants who felt they had not used Reportal enough to answer the post-usage questionnaire.

Participants were drawn from two units in the Faculty of Computing, Health and Science at Edith Cowan University. Unit A, titled Information Services Management, consisted of students from both Information Science (61% of the class) and Information Technology (39% of the class) courses. Demographic details of the participants from Unit A revealed an almost even division of males and females; 22 males to 29 females. The most common age range was 21 to 30 (47%), with a considerable number of participants between 31 and 40 (22%), and 41 and 50 (14%). Almost half (45%) of the participants were studying the unit online, with no on campus activities or face-to-face contact. Students in this unit were assigned into on campus and online groups at random and used Reportal over a number of weeks to complete a short report as a part of the unit's assessable work. The total number of participants from Unit A was 51, distributed amongst 19 groups, 10 of which were online. Students in Unit A were also required, as part of the unit, to write a short reflection on their learning, which included their thoughts regarding Reportal. The reflections were anonymous, hence individual participants could not be identified from this source. Quotes from the reflections have been used to support findings from primary data sources.

Unit B was titled Applied Internet Technology Project. Students arranged themselves into groups, several of which opted to use Reportal to prepare a project proposal required in the unit. Participants from this unit fit a much narrower profile, with 89% being male, 67% between 21 and 30 years of age (22% between 31 and 40) and all enrolled in a course in Computer Science or Information Technology. All participants in Unit B were studying on campus. A total of nine participants were drawn from Unit B, distributed amongst five groups. There was one participant who was enrolled in both units.

Likert-type questions in both the pre-usage and post-usage questionnaires allowed participants to select Strongly Disagree, Disagree, Neutral, Agree or Strongly Agree. While these were in fact statements, they are referred to as questions in this analysis for the sake of readability. Positive and negative responses to Likert-type questions are

defined in this analysis as the combined percentage of agree and strongly agree responses, and the combined percentage of disagree and strongly disagree responses respectively. For example, if a question received 30 strongly agree and 35 agree responses out of a total of 100 responses, the positive response would be 65%. Percentages have been rounded to the nearest whole number.

4.1.1 - Pre-Usage Questionnaire

The pre-usage questionnaire was administered in the first week of the semester, and consisted of three sections, covering the topics of:

- Internet access, use and proficiency.
- Preferences, experiences and beliefs regarding group work.
- Previous experiences with groupware and OLEs.

A mixture of Likert-type, open-ended and closed-response checkbox questions was employed. The primary aim of the pre-usage questionnaire was to establish profiles of participants, through which their actions and responses in the research could be better understood. A copy of the pre-usage questionnaire can be found in Appendix D.

In the first section, responses indicated that the large majority of participants were frequent and experienced Internet users. As shown in Tables 4.1 and 4.2, 78% of participants used the Internet at least once a day, and 90% felt they were experienced users.

Approximately how often do you use the Internet during a week?

	More than Once a Day	Once a Day	Several Times a Week	Less than Twice a Week
# (N=59)	37	9	12	1

Table 4.1 - Pre-Usage Questionnaire: Weekly Internet usage

I am an experienced Internet user.

	SA	A	N	D	SD
# (N=59)	30	23	5	1	0

Table 4.2 - Pre-Usage Questionnaire: Internet experience

Internet access was primarily from home (92%) or university (51%), and 95% of participants often used resources on the Internet to support their studies.

From where do you have regular access to the Internet?

	Home	Work	University	Other
#	54	17	30	1

Table 4.3 - Pre-Usage Questionnaire: Internet access (Participants asked to check all that apply. Public Library as "Other")

I often use resources on the Internet to support my studies.

	SA	A	N	D	SD
# (N=59)	30	26	1	2	0

Table 4.4 - Pre-Usage Questionnaire: Internet study resources

By averaging responses in this section (Tables 4.1, 4.2 and 4.4), an "Internet affinity" statistic was calculated. The average value for this statistic was 78%, confirming the impression given by the individual statistics.

The second section of the pre-usage questionnaire indicated that most of the participants had some experience with small group assignment work in their university studies.

Approximately how many times have you worked in a small group to complete an assignment in your university studies?

	Never	1-3	4-6	7-9	10+
# (N=59)	9	28	17	4	1

Table 4.5 - Pre-Usage Questionnaire: Previous group work instances

Of the 59 participants, 76% reported having previously worked in small groups between one and six times. Although nine participants had never experienced small group work in their university studies, only one of those gave neutral responses for the rest of the section. Further questions suggested a preference for individual work (43%) over group work (32%), correlating with 49% of participants feeling they learnt less in group work compared to 24% who felt they learnt more.

Assignments requiring small group work are more appealing than those requiring individual work.

	SA	A	N	D	SD
# (N=59)	3	16	15	17	8

Table 4.6 - Pre-Usage Questionnaire: Group work appeal

I feel that I learn more in assignments requiring small group work compared to those requiring individual work.

	SA	A	N	D	SD
# (N=59)	3	11	16	25	4

Table 4.7 - Pre-Usage Questionnaire: Group work learning

Participants felt that communication, strong leadership and equal participation were all important in group work, each question receiving more than 80% positive responses.

Communication between group members is important in group assignment work.

	SA	A	N	D	SD
# (N=59)	43	14	2	0	0

Table 4.8 - Pre-Usage Questionnaire: Group work communication

Strong leadership by a group leader is important in group assignment work.

	SA	A	N	D	SD
# (N=59)	22	26	9	2	0

Table 4.9 - Pre-Usage Questionnaire: Group work leadership

Equal participation by group members is important in group assignment work.

	SA	A	N	D	SD
# (N=59)	39	16	5	0	0

Table 4.10 - Pre-Usage Questionnaire: Group work participation

Despite the indication that equal participation was of high importance, 46% of participants reported having experienced unequal participation in previous small group work, 29% stating a history of equal participation.

In my previous group assignment work, participation was equal amongst all members.

	SA	A	N	D	SD
# (N=59)	6	11	15	21	6

Table 4.11 - Pre-Usage Questionnaire: Group work previous participation (All 9 participants who had never experienced group assignment work answered neutral to this question)

While 72% of participants believed they worked well in a group, the majority of participants (46% neutral, 39% negative) preferred not to take the group leader position. Email and face-to-face were identified as the two most common methods of communicating with group members.

I feel that I work well in a group.

	SA	A	N	D	SD
# (N=59)	8	34	14	2	1

Table 4.12 - Pre-Usage Questionnaire: Group worker

When working in small groups, I prefer to be the group leader.

	SA	A	N	D	SD
# (N=59)	0	9	27	16	7

Table 4.13 - Pre-Usage Questionnaire: Group leader

What are your primary means of contacting group members when completing a group-based assignment?

	Email	Instant Messaging	Website / Forum
#	52	19	18
	Group Work System	In Person	Telephone (including SMS)
#	5	35	18

Table 4.14 - Pre-Usage Questionnaire: Group contact (Participants asked to check all that apply)

By averaging responses to key questions regarding group work (Tables 4.6, 4.7 and 4.12), a “group work affinity” statistic was calculated for each participant. Values of this were considerably dispersed, indicating that participants’ attitudes towards group work were varied.

Open-ended questions in the pre-usage questionnaire asked participants what they liked and disliked about group assignment work. Sharing knowledge, views and experience was the most commonly cited like, along with distributing the workload and the social aspects of group work. The primary dislikes were unequal participation, difficulties in finding time to meet, relying on others to complete the unit, and difficulties in communicating with group members.

The final section of the pre-usage questionnaire indicated that the majority of participants had used an OLE in their studies (75%), however 64% reported not having used any other form of groupware.

Have you used an online learning environment such as Blackboard or eCourse in your university studies?

	Yes	No
# (N=59)	44	15

Table 4.15 - Pre-Usage Questionnaire: OLE use

Which of the following group work systems you have used?

	Lotus Notes	Microsoft Sharepoint / Exchange	BSCW
#	3	2	0
	Yahool Groups	Other	None
#	11	8	38

Table 4.16 - Pre-Usage Questionnaire: Groupware used (Participants asked to check all that apply. OLEs such as Blackboard and Email primarily listed as "Other")

Of those that had used groupware, online systems such as Yahoo! Groups were the most common. As shown in Table 4.17, 61% of participants felt that using software or online systems to support group assignment work is essential in order to produce a high-quality outcome.

Using software or online systems to support group assignment work is essential in order to produce a high-quality outcome.

	SA	A	N	D	SD
# (N=59)	11	25	21	2	0

Table 4.17 - Pre-Usage Questionnaire: Groupware need

4.1.2 - Post-Usage Questionnaire

In week 4, after 20 days of usage, the post-usage questionnaire was made available. The post-usage questionnaire consisted three sections, each containing a number of Likert-type questions and open-ended questions. In accordance with the research questions, the sections regarded peer review and participation awareness, the third section asking questions about Reportal as a whole. Open-ended questions asked participants to comment on their likes and dislikes regarding the topic of each section. While 65 responses to the post-usage questionnaire were received, six of these were discarded due to incomplete data sets. A copy of the post-usage questionnaire can be found in Appendix E.

The value of specifically requesting negative feedback became apparent upon comparing questionnaire responses to the Unit A reflections. While participants made good use of the open-ended questions asking about dislikes in the questionnaire, negative feedback was largely omitted or glossed over in the reflections, resulting in overwhelmingly positive feedback. If used as a sole or primary source of data, the Unit A reflections would have provided misleading results. The importance of seeking negative feedback has been recognised in the literature. Ashford and Tsui (1991) state that actively seeking such feedback in the workplace is important, as “individuals are more likely to give each other positive feedback spontaneously and withhold negative appraisals.” Negative feedback is required in order to identify, understand and ultimately correct ineffective actions. While Ashford and Tsui (1991) discussed the issue in relation to individuals in the workplace, the same principles are applicable to seeking feedback via questionnaires.

The section regarding Reportal as a whole received largely positive responses. The opening questions showed that 70% of participants found that Reportal made group work easier to manage, and 55% (25% neutral) found the system made group work more enjoyable.

Reportal made working in a group easier to manage.

	SA	A	N	D	SD
# (N=59)	7	34	7	8	3

Table 4.18 - Post-Usage Questionnaire: Reportal manage group work

Reportal made working in a group more enjoyable.

	SA	A	N	D	SD
# (N=59)	5	28	15	9	2

Table 4.19 - Post-Usage Questionnaire: Reportal enjoyable

Responses regarding the quality of the final document were largely neutral (49%), 40% feeling a better final document was produced. As Table 4.21 illustrates, 72% of participants indicated that they would like to use Reportal again in future group work.

I feel that using Reportal resulted in a better final document compared to previous group work experiences.

	SA	A	N	D	SD
# (N=59)	2	22	29	4	2

Table 4.20 - Post-Usage Questionnaire: Reportal better final document

I would like to use Reportal again in future group work.

	SA	A	N	D	SD
# (N=59)	8	34	12	2	3

Table 4.21 - Post-Usage Questionnaire: Use Reportal again

Other questions regarding the functionality and effectiveness of Reportal received positive responses between 50% and 70%, suggesting that the majority of participants appreciated the features provided by Reportal. Open-ended responses in this section enforced this impression and provided participants room to identify areas and features which could be improved, giving negative responses a context.

Reportal was well suited to the task of writing a document as a group.

	SA	A	N	D	SD
# (N=59)	8	29	15	4	3

Table 4.22 - Post-Usage Questionnaire: Reportal suitable

Reportal made communicating with my group members easy.

	SA	A	N	D	SD
# (N=59)	7	25	16	8	3

Table 4.23 - Post-Usage Questionnaire: Reportal communication

The design and interface of Reportal received a 71% positive response. Many participants commented on the interface in both the post-usage questionnaire and the Unit A reflections. “I liked the layout and design - nice and simple. Even with my dial up connection it was quick and so easy to navigate” (Participant 59, a female on campus student in Unit A) was one such comment from the post-usage questionnaire.

The design and interface of Reportal allowed me to use the system effectively.

	SA	A	N	D	SD
# (N=59)	9	33	11	5	1

Table 4.24 - Post-Usage Questionnaire: Reportal interface & design

One question asked participants if they felt that Reportal was better suited to groups working primarily or solely online, to which there was a 76% positive response. An analysis of the demographic data found that that 73% of strongly agree responses came from on campus participants, while both the strongly disagree responses came from online participants. Open-ended responses indicate that the strongly disagree responses may have been due to difficulties faced by online participants who tried to use the Reportal’s asynchronous message board as a synchronous chat facility.

I feel that Reportal is more useful for groups working primarily online, with little or no face-to-face contact.

	SA	A	N	D	SD
# (N=59)	15	30	7	5	2
OC (N=36)	11	18	4	3	0
OL (N=23)	4	12	3	2	2

Table 4.25 - Post-Usage Questionnaire: Reportal better online (Compares responses from On Campus (OC) and Online (OL) participants.)

The peer review components of Reportal received an overall positive response from participants, however a substantial number of neutral responses were recorded. Responses to open-ended questions in this section indicate that many of the neutral responses came from individuals who did not make use of Reportal’s peer review capabilities. Kalton, Roberts and Holt (1980), referencing the findings of Payne, suggest that a neutral response should be offered in questions designed to discover convictions rather than leanings. Despite this, a neutral response was deemed appropriate in this research to prevent forcing a response from participants who had not used the system enough to develop an opinion to answer certain questions. Open-ended questions served to alleviate the impact of the neutral option by allowing participants to explain their response and provide general feedback. Responses to open-ended questions provided a valuable context for the Likert-type responses. Additionally, no default values existed in either questionnaire (i.e. the scaled responses had no preselected value). This ensured that participants were required to select a specific response, even if it was neutral.

A total of 85% of participants reported making an effort to read all submissions of work within their group, 54% also making an effort to comment on submissions. Reportal’s peer review capabilities include the ability to rate submissions anonymously on a scale

of one to five, an average rating being displayed above the comments. This feature was not widely used, with 34% of participants indicating they made an effort to rate the contributions of their group members. In open-ended responses, several participants stated that they chose not to rate submissions as they were concerned about the effect it could have on the group dynamic.

I made an effort to read all contributions of other group members.

	SA	A	N	D	SD
# (N=59)	19	31	8	1	0

Table 4.26 - Post-Usage Questionnaire: Read all contributions

I made an effort to post a comment on the contributions of other group members.

	SA	A	N	D	SD
# (N=59)	4	28	20	6	1

Table 4.27 - Post-Usage Questionnaire: Comment all contributions

I made an effort to rate the contributions of other group members.

	SA	A	N	D	SD
# (N=59)	3	17	26	7	6

Table 4.28 - Post-Usage Questionnaire: Rate all contributions

A question regarding the helpfulness and constructiveness of comments received primarily neutral responses, at 47% neutral and 44% positive. Similarly, a question regarding whether or not participants revised submissions based on feedback received 39% neutral and 42% positive responses. Taking into account the open-ended responses identifying groups who did not make use of the peer review capabilities, it can be surmised that groups who commented on submissions found the process constructive and beneficial.

I found comments on my contributions to be helpful and constructive.

	SA	A	N	D	SD
# (N=59)	3	23	28	4	1

Table 4.29 - Post-Usage Questionnaire: Comments helpful

I revised some of my contributions based on the feedback of group members in Reportal.

	SA	A	N	D	SD
# (N=59)	3	22	23	8	3

Table 4.30 - Post-Usage Questionnaire: Comments caused revision

The final Likert-type questions in the peer review section asked participants if they felt Reportal's peer review capabilities helped their group work together and made the group work process more enjoyable. Responses to these questions correlated with previous questions, receiving neutral and positive responses between 40% and 50%. The final Likert-type question in this section asked participants if they felt peer review had a positive impact overall, to which 49% of responses were positive and 42% were neutral.

I found that peer review helped the group work together.

	SA	A	N	D	SD
# (N=59)	4	23	26	6	0

Table 4.31 - Post-Usage Questionnaire: Peer review helped group work

Overall, I found peer review made group work more enjoyable.

	SA	A	N	D	SD
# (N=59)	3	22	28	4	2

Table 4.32 - Post-Usage Questionnaire: Peer review enjoyable

Overall, I found peer review to have a positive effect on the group.

	SA	A	N	D	SD
# (N=59)	3	26	25	4	1

Table 4.33 - Post-Usage Questionnaire: Peer review positive

Responses to open-ended questions identified the ability to obtain feedback from group members and revise submissions based on this feedback as the primary benefit of peer review. Group members not commenting or responding to comments and the potential for unconstructive or resentful comments were listed as negatives.

Referred to as "member awareness statistics" in the questionnaire for better recognition by the participants, Reportal's participation awareness feature received a mixed response. A substantial amount of neutral responses were received in some questions. As with the peer review section, open-ended questions helped to put the neutral

responses into context, identifying them primarily as responses from those participants who ignored the feature entirely. While non-neutral responses in the section were primarily positive, a larger percentage of negative responses were received than in the peer review section. Negative responses in the participation awareness section (Tables 4.34 to 4.41) averaged 25%, compared to an average of 12% in the peer review section (Tables 4.26 to 4.33).

The first question of the section asked participants if they placed a lot of importance on the member awareness statistics. Responses to this were divided at 29% positive, 37% neutral, and 34% negative. A reason for this division may lie in the responses to the next question, which asked participants if they felt the member awareness statistics accurately reflected their participation. While a positive response of 44% was received, neutral and negative responses were 32% and 23% respectively, indicating that a considerable number of participants did not believe the statistics to be accurate.

I placed a lot of importance on the member awareness statistics.

	SA	A	N	D	SD
# (N=59)	1	16	22	13	7

Table 4.34 - Post-Usage Questionnaire: Member awareness statistics important

I feel that the member awareness statistics accurately reflected my own participation in the assignment.

	SA	A	N	D	SD
# (N=59)	5	21	19	5	9

Table 4.35 - Post-Usage Questionnaire: Member awareness statistics accurate

The questionnaire then asked participants if they found that the member awareness statistics encouraged them to be more active in Reportal and work harder. To this, 58% of participants reported being encouraged to be more active, while 49% reported working harder.

I found that the member awareness statistics encouraged me to be more active in Reportal.

	SA	A	N	D	SD
# (N=59)	7	27	16	5	4

Table 4.36 - Post-Usage Questionnaire: Member awareness statistics encourage activity

I found that the member awareness statistics encouraged me to work harder.

	SA	A	N	D	SD
# (N=59)	5	24	14	12	4

Table 4.37 - Post-Usage Questionnaire: Member awareness statistics encourage work

Attempting to discover the impact of participation awareness, a question asked participants if they felt the member awareness statistics helped the group work together. This received a primarily neutral response (49%), followed by 26% negative and 26% positive responses, indicating that the impact of this feature was not fostering collaboration. Another question asked participants if the statistics played a part in shaping their perceptions of other group members. This question received a 55% positive response, indicating that perhaps the impact of participation awareness relates more to the development of trust and social presence within a group.

I found that the member awareness statistics helped the group work together.

	SA	A	N	D	SD
# (N=59)	4	11	29	7	8

Table 4.38 - Post-Usage Questionnaire: Member awareness statistics helped group work

The member awareness statistics played a part in shaping my perceptions of other group members.

	SA	A	N	D	SD
# (N=59)	5	28	11	7	6

Table 4.39 - Post-Usage Questionnaire: Member awareness statistics shaped perceptions

Two questions asked participants if they felt the member awareness statistics made group work more enjoyable and had a positive impact overall. While responses to the question of enjoyment were divided (34% positive, 36% neutral and 30% negative), those regarding a positive impact were primarily positive and neutral, 39% and 44% respectively. Taking into account a proportion of neutral responses coming from participants who did not notice or use the feature and the relatively low percentage of negative responses, this question seems to signify that the overall impact of participation awareness was positive.

Overall, I found the member awareness statistics made group work more enjoyable.

	SA	A	N	D	SD
# (N=59)	6	14	21	13	5

Table 4.40 - Post-Usage Questionnaire: Member awareness statistics enjoyable

Overall, I found the member awareness statistics to have a positive effect on the group.

	SA	A	N	D	SD
# (N=59)	6	17	26	5	5

Table 4.41 - Post-Usage Questionnaire: Member awareness statistics positive

The open-ended questions in this section exposed several reasons for the mixed response to the member awareness statistics. Participants reported liking the feature as it provided an at-a-glance display of participation, helping them to identify who was active and working in their group. Some participants also reported feeling that the statistics motivated and encouraged them to be more active and work harder, as reflected in previous Likert-type questions. Qualitative responses in both the post-usage questionnaire and the Unit A reflections revealed that one group treated the statistics as a game, referring to the way they rose as “levelling up.” This indicates that despite some participants not taking the statistics seriously or placing a high amount of importance on them (Table 4.34), the statistics were still able to encourage participation and activity in Reportal.

Participants disliked the member awareness statistics for being inaccurate. This was attributed largely to the fact that the statistics were a purely quantitative measure, not reflecting the quality of contributions and deemed unsuitable for certain working styles. A comment in the Unit A reflections reading “Although this [the member awareness feature] is important to make sure everyone is contributing, they only reflect the quantity of participation not quality. Some people may respond less but their responses may be of a better quality.” As a quantitative measure, some participants also recognised the potential for abuse via spamming or gaming the system. These factors were reported to decrease trust in the statistics, a feeling which may have influenced responses to the question regarding the perceived importance of the statistics (Table 4.34).

A question in both the peer review and participation awareness sections of the post-usage questionnaire asked participants if they felt the features would have a greater impact over a longer period of time. To these questions, 63% responded positively

regarding peer review, and 54% responded positively regarding participation awareness. Negative responses were 5% and 14% respectively, in line with the overall responses to both features.

I feel that peer review would have a greater impact over a longer period of time.

	SA	A	N	D	SD
# (N=59)	6	31	19	3	0

Table 4.42 - Post-Usage Questionnaire: Peer review over long term

I feel that the member awareness statistics would have a greater impact over a longer period of time.

	SA	A	N	D	SD
# (N=59)	6	26	19	4	4

Table 4.43 - Post-Usage Questionnaire: Member awareness statistics over long term

4.1.3 - Usage Statistics and Logs

Analysis of the usage statistics and logs generated by Reportal identified several trends within groups. To understand these trends better, questionnaire responses were re-evaluated on a group by group basis. Groups in which the majority of members did not provide a full set of data were eliminated from group-based analysis. Logs of such groups demonstrated very little usage of the system. From the 24 original groups, 19 were suitable for analysis, eight of those online.

Based on the number of logs generated and questionnaire responses, it was found that participants in groups with high system usage tended to give positive feedback regarding Reportal and the peer review capabilities. This trend was identified in 13 of the 19 groups. Amongst the high usage groups, seven gave primarily negative and four gave primarily positive feedback regarding participation awareness, with two groups being primarily neutral.

Groups working entirely online used the communication features of Reportal more extensively than groups with face to face contact. Most frequently used was the “chat” area in the main page, which allowed members to post short messages to the whole group. Over 100 chat messages were posted by 50% of online groups, while only 18% of on campus groups did so. While this feature operated asynchronously, several groups attempted to use it as an instant messenger style synchronous tool. Post-usage

questionnaire responses and Unit A reflections revealed that this caused some frustration, as the page had to be refreshed in order to see new messages.

4.2 - Discussion

Responses to the pre-usage questionnaire revealed several overarching characteristics in the participants. The large majority of participants reported being frequent and experienced Internet users. While this is hardly surprising in university level Information Technology and Information Science classes, it provides some assurance that the concept and interface of a system such as Reportal will not be overly foreign to participants. The question which identified online tools such as Yahoo! Groups as the type of groupware most frequently used by participants supports this. While Reportal was a new piece of software, the fact that it was Web-based and therefore consisted of common elements such as hyperlinks and forms provided comfort to the participants, one stating "It is very convenient and easy for people with minimal computer knowledge to use the program with confidence" (anonymous participant, Unit A reflections). The softened learning curve lends weight to findings regarding individual features, as the majority of participants were not struggling to come to grips with the system as a whole, and thus able to evaluate features individually.

The pre-usage questionnaire also provided a somewhat consistent profile of participants in relation to group work. While most participants had experienced group work in their university studies, most preferred individual work and felt they learnt more when working alone. Strong leadership, effective communication and equal participation were all identified as important components of group work, and a substantial number of participants reported having experienced unequal participation in previous group work. Taking the qualitative responses into account, it can be said that while most participants can see the potential advantages of group work, they still prefer to work individually, an outlook possibly influenced by previous group work experiences. Given these indications of the factors influencing participants' perceptions of group work, the inclusion of participation awareness and peer review mechanisms are well justified. As detailed in the literature review, participation awareness and peer review are features which have the potential to support collaboration, participation and communication

(Bjørn, Fitzgerald, & Scopula, 2003; Borges, Pino, & Valle, 2001; Dourish & Bellotti, 1992; McGourty, Dominick, & Reilly, 1998).

As the post-usage questionnaire was the primary data source in this research, further discussion will be divided into the sections utilised in the questionnaire. These sections also correlate with the research questions.

4.2.1 - Reportal

The response to Reportal was consistently positive across all sources of data. The majority of participants appreciated the features and functionality provided by Reportal. Several participants, primarily on campus, displayed and admitted low usage of the system. While their responses to the post-usage questionnaire accounted for a large amount of neutral responses, most were able to identify tenets or core features of Reportal which they felt were positive. Having all work and communications on a single system and the ability to export a single final document were often listed as benefits, indicating that participants support the concept of a centralised groupware tool. Many participants also identified the interface and design of the system as a benefit, finding it simple and efficient.

There were a few participants who responded entirely or largely negatively to the system. Qualitative responses from both questionnaires identified the following reasons for strongly negative responses:

- An established and distinct dislike of group work.
- An unwillingness to deviate from an established style of working.
- A strong dislike of a specific element or feature of Reportal.

Responses to the post-usage questionnaire and Unit A reflections identified a number of ways in which participants felt Reportal could be improved. Table 4.44 outlines and categorises the most frequently raised suggestions.

Suggested changes for future versions of Reportal.

Functionality

- Ability to define multiple documents at the same time
- Ability to upload files (documents, images, etc)
- Support for text formatting and other word processing features

Communication

- Real time chat area with larger message capability
- Threaded discussion forum to discuss multiple topics
- Indication of who is currently online

Integration

- Email alerts for events (e.g. submission of document section)
- Integration with existing OLE (consistent username and password)
- Direct submission of final document as assignment

Table 4.44 - Suggested changes to Reportal (Changes pertaining to peer review and participation awareness have been omitted to be covered below)

A substantial number of participants suggested the ability to upload files as an improvement. Reportal aims to eliminate the problems associated with managing different versions of the same file by providing a single current version of the document in progress. For this reason, the inclusion of such a feature would likely be limited to the uploading of images and charts to be inserted into document sections written in Reportal. Similarly, many participants desired the ability to format text when writing document sections. While possible, it was felt that this feature would detract from the ability to produce a consistently formatted final document. It was expected that groups would be required to add final touches to their documents after exporting them from Reportal, however qualitative responses to the post-usage questionnaire and Unit A reflections made it apparent that some participants felt this to be a fault of the system.

4.2.2 - Peer Review

While the initial impression given by the post-usage questionnaire statistics was that peer review only had a mildly positive effect, further analysis revealed that this was influenced by the high proportion of neutral responses. The open-ended questions revealed that the majority of these responses came from participants who did not make use of the peer review features, typically groups with low overall system usage. Even with between 30% and 50% neutral responses, positive responses to questions regarding

the impact of peer review had positive responses consistently in the mid 40%s. In contrast, negative responses to these questions never exceeded 10%.

With 46% of participants stating that Reportal's peer review features helped their group work together (Table 4.31) and 42% stating that it made group work more enjoyable (Table 4.32), the primary impact of the feature appears to be supporting collaboration and interaction. This is enforced by the positive responses to the questions which asked participants if comments were helpful and constructive, led to work being revised, and made group work more enjoyable. Questions asking participants if they made an effort to read and comment on the majority of submissions both received highly positive responses, indicating that peer review also served to facilitate task-oriented communication between group members. This was supported by open-ended responses, several participants stating that being able to comment on individual submissions made it easier to discuss the sections effectively. In a study regarding social presence in OLEs, Russo and Campbell (2004) note that due to the text-based medium of online distance education, "signals of interest, approval, or potential question must be generated by a deliberate action", and that the effort required to do this "may seem more trouble than it is worth." By making the peer review process quick, simple and efficient, Reportal encouraged participants to provide feedback on submissions of others, a conclusion supported by several open-ended responses to the Unit A reflections.

It is likely that the acceptance and perceived benefit of Reportal's peer review features were partly due to the fact that peer review is an established concept with which most students are familiar or at least aware. Likewise, Reportal's peer review features employ the same core functions as a threaded discussion forum, each submission acting as a thread to which users can post replies in the form of feedback. Implementing peer review in such a fashion no doubt helped to encourage participation. In this sense, the impact of asynchronous communication, as discussed in section 2.3, also became apparent. Participants reported that posting comments and replying to the comments of others helped them to analyse the assignment content in greater depth. This impact reflects that of asynchronous online discussion in general, Beasley and Smyth (2004) finding that "The increased opportunity for students to reflect on their own opinions and

those of others before contributing to an online discussion has the potential to lead to a deeper, more reasoned exchange of views than is often possible in real-time situations.”

Overall, the data indicates that peer review mechanisms in online group work environments are highly beneficial, supporting collaboration and increasing social presence through communication. “[Peer review] enabled the submissions to be edited according to the views of the group rather than the individual” (Participant 38, an older female online student in Unit A) was one of many comments which summarised the impact of peer review.

Very few responses identified ways in which the implementation of Reportal’s peer review features could be improved; negative comments typically concerned group members who ignored comments and the potential for unconstructive or resentful comments. One aspect of the peer review features which remained largely unused was the ability to rate submissions anonymously, with an average of all ratings being displayed. In support of anonymous peer assessment, Mann (2005) states that such a feature has the potential to reduce social pressure and result in more accurate and critical feedback. Several participants voiced concerns about the impact such a rating could have on the group dynamic as a reason for not using the feature, while the majority of participants seemed to ignore it entirely. While evidence from the data and support from the literature is sparse, two interrelated hypotheses present themselves to explain the lack of usage:

- Ratings were seen as superfluous and unconstructive given the ease of commenting.
- The number of active members per group was small enough to weaken the anonymity of ratings and diminish the worth of an average rating.

Based on this, the author theorises that a rating feature is of limited use in a small group environment, and would be more suited to larger groups or communities where ratings can remain truly anonymous and an average rating is of greater value. Further research is recommended.

4.2.3 - Participation Awareness

The participation awareness feature of Reportal received a mixed response. The post-usage questionnaire revealed that while most participants realised the potential benefits of such a feature, the possible inaccuracy of a purely quantitative measure was just as frequently realised. A considerable number of participants felt that this potential for inaccuracy diminished the benefits of the feature, one participant stating that “a member could post several chat messages that were of little value to the group work, but still receive points for it” and hence the statistics were “not a true reflection of a member’s contribution to the group” (anonymous participant, Unit A reflections).

The perceived inaccuracy of the member awareness statistics were seen as a major issue by participants, with the question regarding accuracy (Table 4.35) receiving 9 strongly disagree responses, the largest number in the entire post-usage questionnaire. The question asking participants how much importance they placed on the statistics (Table 4.34) reflects this, with the negative response outweighing the positive. While this statistic indicates that the majority of participants did not place much importance on the feature, open-ended responses show that it still had a substantial impact. This is particularly apparent in the Unit A reflections, where participants were not required to comment on any specific features of Reportal. The large majority of reflections included some mention of the participation awareness feature. It is highly likely that the way the member awareness statistics were prominently displayed on the main page of the system contributed largely to their impact. Several participants suggested making the statistics less prominent by moving them to another page or having the ability to hide them.

The member awareness statistics were generated via an algorithm which drew quantitative data from the database, making them entirely objective. It was expected that participants would recognise this and then proceed to interpret the statistics subjectively within the context of their group. This occurred to some extent, as participants recognised that the statistics sometimes failed to reflect activity in their group accurately, however the data suggests that many participants then discounted or ignored the feature. One participant commented “The raw numbers did not reflect the actual work put in, however if examined correctly the numbers may prove useful to a manager in the real world” (anonymous participant, Unit A reflections). The positive

feedback regarding the feature indicates that participants did indeed draw some useful meaning from the statistics. This was perhaps lessened by confusion as to how the statistics were generated. Details of the algorithm were deliberately kept vague to deter gaming. While some information was made available (Figure 4.3), post-usage questionnaire responses suggest that many participants did not read it. Several participants expressed a desire to know more about how the statistics were calculated.

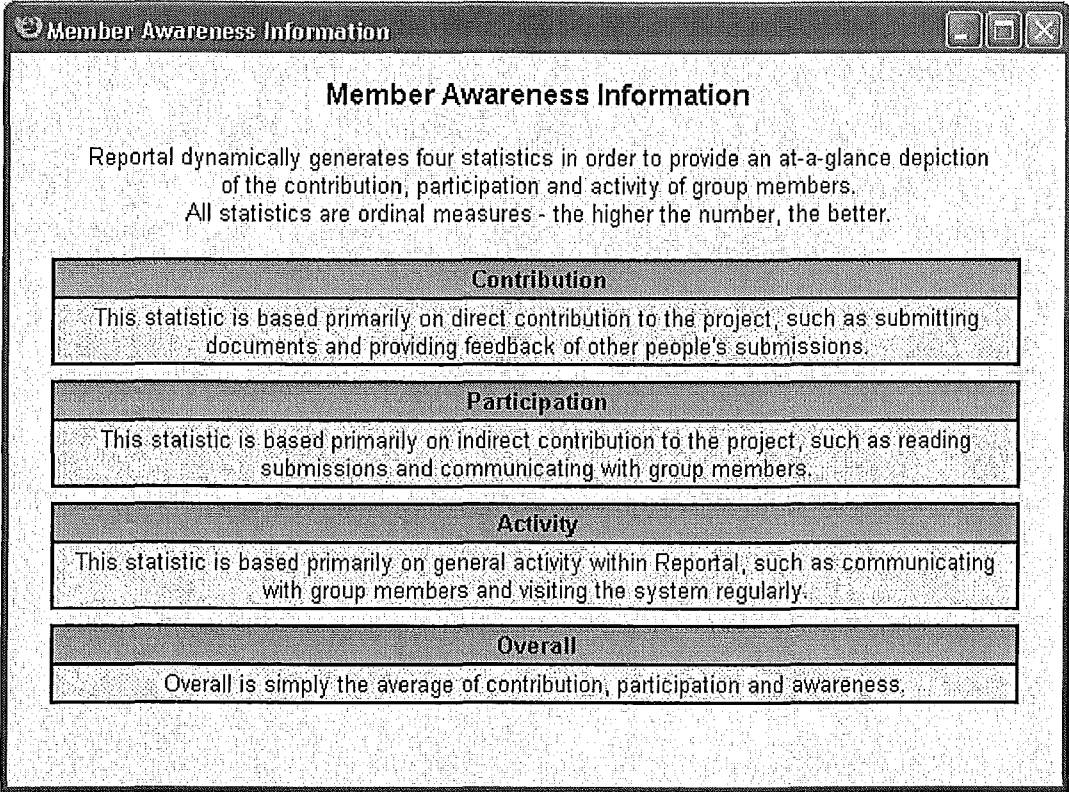


Figure 4.3 - Reportal Screenshot: Member Awareness Information

Despite the perceived inaccuracy of the statistics, the post-usage questionnaire data found that they did in fact have a positive impact. Participants reported that the member awareness statistics encouraged them to be more active in Reportal (Table 4.36, 58%) and work harder (Table 4.37, 49%). While participants did not strongly indicate that the member awareness statistics helped groups work together or make group work more enjoyable (Tables 4.38 and 4.40), promoting activity and work is undeniably beneficial. The other benefit was to awareness. Regardless of the accuracy of the statistics, they were able to identify which group members were active and contributing to some extent. This is supported by many open-ended responses such as “[The member awareness statistics] gave me a quick overview of the level of activity of all members in the group”

(Participant 59). So while the impact of Reportal's participation awareness mechanisms on collaboration itself was minimal, the impact on activity and awareness was considerable. Both increased awareness and increased activity in the system have the potential to foster social presence and trust, creating a better atmosphere for collaborative learning (Bjørn, Fitzgerald, & Scopula, 2003; Borges & Pino, 1999; Dourish & Bellotti, 1992). One participant remarked that while he felt the member awareness statistics gave "a good overview of team member contributions", he "don't [sic] trust it completely" (Participant 40, a male on campus student in Unit A). Similar sentiments were expressed by a number of participants. Stemming from the perceived inaccuracy of the statistics, this lack of trust has the potential to damage or stifle the development of trust between peers in the environment as a whole. Such an impact would be detrimental to creating a positive social and collaborative working environment (S. Cohen & Gibson, 2003; Hughes, Wickersham, Ryan-Jones, & Smith, 2002; Rovai, 2001).

The data strongly indicates that while the member awareness statistics can be accurate, there is great potential for inaccuracy. Refining the algorithms used to generate the statistics and implementing measures to prevent gaming of the system could improve this accuracy, however the measure still remains purely quantitative. Implementing qualitative elements to the statistics would require some form of group member input. This is undesirable, as there is little purpose in having a system which tells you how well members are contributing if you first have to tell the system. Therefore it becomes apparent that providing a reliably accurate measure of activity, participation and contribution without placing a burden on users is not overly feasible. With this in mind, based on the post-usage questionnaire and Unit A reflection data, two primary changes have been identified which participants indicate would improve the implementation of Reportal's participation awareness feature:

- Make the feature less prominent. This could be achieved by removing it from the main page, allowing it to be hidden, or reducing the size of the display.
- Make any computations transparent. Clearly explain any algorithms used, or display raw statistics. The accuracy of raw statistics is easier to interpret.

Changes must be made to improve the user support and acceptance of participation awareness mechanisms in future implementations, while retaining the benefits of encouraging activity and raising member awareness.

Chapter 5 - Conclusion

This research set out to explore two novel features of a groupware system, evaluating the impact on the elements of online collaboration. Investigations of the influences of features themselves have not been extensive in CSCL and CSCW research, but such research has much potential to improve online collaborative environments in both education and enterprise.

While the research was a preliminary investigation, the findings indicate that peer review and participation awareness mechanisms in groupware have distinct positive impacts on the elements of online collaboration. These findings provide a framework for further research into the features, which may lead to their refinement and eventual widespread implementation in online collaborative environments.

5.1 - Limitations of Research

As stated in Chapter 3, “generalization of results, from either single or multiple [case study] designs, is made to theory and not to populations” (Tellis, 1997). This study found that peer review and participation awareness features had a measurable impact to the elements of online collaboration, and that this impact was positive. It cannot be said that these findings will be reproducible in all groups collaborating via groupware. While the study employed a significant number of groups for a multiple case study design, the final sample consisted of 59 students. Furthermore, while participants demonstrated a fairly broad range of demographic and educational attributes, they were drawn from only two units in the same university. Such a sample limits the generalisability of the findings.

This research was explorative in nature, and hence the findings cannot be considered absolute until they are supported by substantial empirical research. Further research, both quantitative and qualitative, is required in order to determine possible causal relationships between groupware features and online collaboration.

5.2 - Key Findings

In discussing the key findings of this research, it is only fitting that the research questions are addressed. In order to evaluate the impacts of the two features under investigation independently, two subsidiary questions were defined.

Reportal's peer review features involved the ability to comment upon and rate the submissions of group members. While the ratings feature was largely ignored by participants, commenting on submissions was used extensively, and had a considerable impact in the environment. Crucial to this impact was the simple and user-friendly manner in which the feature was implemented. With regard to the elements of online collaboration, peer review had a direct impact on collaboration itself, as it allowed participants to work together in revising and improving their submissions. Peer review also encouraged consistent communication within groups and, as this communication was task-based, it could be seen to increase elements such as interaction and trust. Results of this research indicate that peer review has a pronounced positive impact on the elements of online collaboration in an online environment. These findings correlate well with the concepts of constructivist education and the impact of asynchronous communication, as previously discussed. Fahy (2003), citing Mugridge and Kaufman, describes the impact of peer-to-peer interaction in an online environment, which Reportal's peer review feature achieves:

To summarize, technology-based interaction, especially peer-to-peer, because it is readily available and increasingly familiar, may constitute a valuable source of support, and under some distance education circumstances might even be viewed as essential for a full and successful (reflective and collaborative) learning experience, supporting two long-acknowledged goals of distance education, learning and socialization.

Reportal's participation awareness features generated statistics relating to activity, participation and contribution of group members. The statistics were prominently displayed in the system, no doubt contributing largely to the impact they had. Participants found the member awareness statistics to be inaccurate and open to abuse, a result of their quantitative nature. Despite this, the data indicates that participation awareness had a positive impact on awareness and activity in the system, two identified elements of online collaboration. While the data indicated that participation awareness did not have a measure on collaboration itself, an increase in awareness and activity can

contribute to collaboration via promoting social presence. The perceived inaccuracy of the statistics lessened their positive impact, and has the potential to have a negative impact on trust amongst group members, so changes to the current implementation would be required in order to realise the benefits of the feature fully. Results of this research indicate that participation awareness has an overall positive impact on the elements of collaboration in an online environment, but further refinement of the feature is necessary.

The findings of this research indicate that the inclusion of these features in online environments is justified and warrants further investigation.

5.3 - Recommendations for Future Research

The features explored in this research were both found to have a positive impact on the elements of online collaboration. The implementation of peer review was well received, however the rating component not extensively used by participants. Research into the reasons why the rating mechanism was not used could reveal ways in which it might be improved. Drawing on previous studies, Topping (1998) suggested that “even simple quantitative feedback can have positive formative effects in terms of improved scores/grades and the subjective perceptions of participants.” This potential for improvement justifies further research into such a feature. Subsequent research into peer review mechanisms in groupware could evaluate it from a social perspective, adding breadth to the understanding of this feature.

The impact of Reportal’s participation awareness feature was lessened by the lack of accuracy perceived by participants. While a subjective measure of quality is inherently impossible to derive from purely quantitative statistics, future research could identify ways in which the feature could be improved. The changes suggested in section 4.2.3 are likely to improve the implementation of the feature, and further research based on these suggestions is recommended. Further research regarding participation awareness from a social perspective is also strongly recommended.

The impact of introducing a new system was minimised by the fact that Reportal was Web-based and participants were experienced Internet users. However, it would be

appropriate for future research to incorporate peer review and participation awareness mechanisms into existing groupware systems already familiar to participants. Doing so would better allow participants to evaluate the impact of the features independent of the underlying system. Such an approach would also facilitate the creation of a control group, making field experiments a viable methodology. Additionally, studies utilising future versions of Reportal could be conducted, applying the findings of this research to refine the features of the system.

Research over a longer time period is desirable; participants in this research had four weeks to use the system. A longer timeframe would lessen the impact of introducing a new system by allowing participants time become proficient in using the software. Many participants indicated that they felt the impact of both features would be greater over a longer time period (Tables 4.42 and 4.43). Subsequent research over longer time periods could serve to identify factors and impacts not observable in a short term explorative study. Group composition is another factor around which further studies could be based. Demographic, social and educational attributes could be considered. Social attributes, such as groups consisting of friends, and educational attributes, such as undergraduate and postgraduate or online and on campus, are of particular relevance given the higher education context of this research.

Finally, further research of this type regarding different features is recommended. This research aimed to identify the impact of novel or non-standard features in groupware systems in order to determine if their inclusion was beneficial to users. Continued research in this vein will result in a better understanding of online collaboration, demonstrated in the effective implementation of features which support it.

5.4 - Conclusion

Constructivist pedagogy is becoming increasingly common in all stages of education, emphasising social interaction and collaborative development of knowledge amongst peers. With almost all universities adopting OLEs to deliver distance education and supplement traditional courses, collaborative learning has been identified as a core component to the success of such systems. Encapsulating this is the common group-based assignment of producing a lengthy document; a process which needs specialised

software to coordinate in an online form. This research introduced such a software application, Reportal, and examined the impact of two novel features. Drawing on the literature, a typology of the elements of online collaboration was created, encapsulating the facets which support collaboration in an online environment. It is from this perspective that the research examined the impacts of participation awareness and peer review, ensuring that the features were evaluated in a way which was relevant to the effectiveness of the environment.

Using a case study methodology with questionnaires, usage statistics, logs and textual reflections as sources of data, the research observed participants' interactions with Reportal and evaluated the impact of participation awareness and peer review on small collaborative groups. The research found that both features had a positive impact on the elements of online collaboration. While the research was exploratory in nature, it is a non-trivial first step towards identifying specific non-standard features of groupware which support collaboration. Research in such an area is important given the emergence of constructivist pedagogy and OLEs in higher education. By building on research such as this, OLEs and groupware systems of the future can be designed to foster collaborative learning amongst peers, furthering educational outcomes and course satisfaction.

References

- AdventNet Inc. (2006). Zoho Writer - online word processor. Retrieved 05/05/06, from <http://www.zohowriter.com/Home.do>
- Alavi, M. (1994). Computer-mediated collaborative learning: An empirical evaluation. *MIS Quarterly*, 18(2), 159-174.
- Allan, J., & Lawless, N. (2003a). *Methods of reducing stress caused by on-line collaboration in e-learning: a developing model*. Paper presented at the European Conference on E-Learning, Glasgow.
- Allan, J., & Lawless, N. (2003b). Stress caused by on-line collaboration in e-learning: a developing model. *Education + Training*, 45(8/9), 564-572.
- Allan, J., & Lawless, N. (2004). Understanding and reducing stress in collaborative e-learning. *Electronic Journal on e-learning*, 2(1).
- Appelt, W., & Birlinghoven, S. (2001). *What groupware functionality do users really use? Analysis of the usage of the BSCW system*. Paper presented at the Ninth Euromicro Workshop on Parallel and Distributed Processing.
- Ashford, S. J., & Tsui, A. S. (1991). Self-regulation for managerial effectiveness: The role of active feedback seeking. *The Academy of Management Journal*, 34(2), 251-280.
- Avison, D. E., Lau, F., Myers, M. D., & Nielsen, P. A. (1999). Action research. *Communications of the ACM*, 42(1).
- Bahli, B., & Büyükkurt, M. D. (2005). Group performance in information systems project groups: An empirical study. *Journal of Information Technology Education*, 4, 97-113.
- Bannon, L. J. (1995). Issues in computer-supported collaborative learning. *Computer Supported Collaborative Learning* (pp. 267-281): Springer-Verlag.
- Barab, S. A., Thomas, M. K., & Merrill, H. (2001). Online learning: From information dissemination to fostering collaboration. *Journal of Interactive Learning Research*, 12(1), 105-143.
- Beasley, N., & Smyth, K. (2004). Expected and actual student use of an online learning environment: A critical analysis. *Electronic Journal on e-learning*, 2(1).
- Bell, B. S., & Kozlowski, S. W. J. (2002). A typology of virtual teams: Implications for effective leadership. *Group & Organization Management*, 27(1), 14-49.
- Bentley, R., Horstmann, T., Sikkil, K., & Trevor, J. (1995). *Supporting collaborative information sharing with the World Wide Web: The BSCW shared workspace system*. Paper presented at the 4th International World Wide Web Conference, Boston, MA.

- Bjørn, P., Fitzgerald, B., & Scopula, A. (2003). *The role of social awareness in technology acceptance of groupware in virtual learning teams*. Paper presented at the 26th Information Systems Research Seminar in Scandinavia, Scandinavia.
- Borges, M. R. S., & Pino, J. A. (1999). *Awareness mechanisms for coordination activities in asynchronous CSCW*. Paper presented at the 9th Workshop on Information Technologies and Systems, Charlotte, North Carolina.
- Borges, M. R. S., Pino, J. A., & Valle, C. (2001). *Interfaces for groupware*. Paper presented at the Conference on Human Factors in Computing Systems, Seattle, Washington.
- Brown, A. (1997). Designing for learning: What are the essential features of an effective online course? *Australian Journal of Educational Technology*, 13(2), 115-126.
- Clark, J. (2000). Collaboration tools in online learning environments. *Asynchronous Learning Networks Magazine*, 4(1).
- Clark, T. (2003). *Disadvantages of collaborative online discussion and the advantages of sociability, fun and cliques for online learning*. Paper presented at the Conferences in Research and Practice in Information Technology Series, Melbourne, Australia.
- Cohen, M. S., & Ellis, T. J. (2002). *Developing a criteria set for an online learning environment*. Paper presented at the 32nd ASEE/IEEE Frontiers in Education Conference, Boston, MA.
- Cohen, S., & Gibson, C. (2003). Mutual understanding, integration and trust: Creating conditions for virtual team effectiveness: Center for Effective Organizations, Marshall School of Business.
- Collins, M., & Berge, Z. L. (1996). Facilitating interaction in computer mediated online courses. Retrieved 27/01/06, from <http://www.emoderators.com/moderators/flcc.html>
- Conrad, D. (2002). Deep in the hearts of learners: Insights into the nature of online community. *Journal of Distance Education*, 17(1), 1-19.
- Conrad, D. (2005). Building and maintaining community in cohort-based online learning. *Journal of Distance Education*, 20(1).
- Cunningham, W. (2002). What Is Wiki. Retrieved 08/06/06, from <http://wiki.org/wiki.cgi?WhatIsWiki>
- Curtis, D. D., & Lawson, M. J. (2001). Exploring collaborative online learning [Electronic Version]. *Journal of Asynchronous Learning Networks*, 5, 21-34. Retrieved 15/03/06 from http://www.sloan-c.org/publications/jaln/v5n1/v5n1_curtis.asp.
- Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, 32(5), 554-571.

- Dillenbourg, P., Baker, M., & O'Malley, C. (1996). The evolution of research on collaborative learning. In E. Spada & P. Reiman (Eds.), *Learning in Humans and Machine: Towards an interdisciplinary learning science*. (pp. 189-211). Oxford: Elsevier.
- Dochy, F., Segers, M., & Sluijsmans, D. (1999). The use of self-, peer and co-assessment in higher education: A review. *Studies in Higher Education*, 24(3), 331-350.
- Dourish, P., & Bellotti, V. (1992). *Awareness and coordination in shared workspaces*. Paper presented at the ACM Conference on Computer-Supported Cooperative Work, Toronto, Ontario, Canada.
- Duffy, J. (1996). Collaborative computing, groupware and knowledge. *Information Management & Computer Security*, 4(2), 39-41.
- Dwyer, W., Sunal, D., Giesen, J., Sunal, C., & Trundle, K. (2001). *Assessing best practices in online learning: A review of the literature*. Paper presented at the Society for Information Technology and Teacher Education International Conference, Norfolk, Virginia.
- Fahy, P. J. (2003). Indicators of support in online interaction [Electronic Version]. *International Review of Research in Open and Distance Learning*, 4. Retrieved 25/01/2005 from <http://www.irrodl.org/index.php/irrodl/article/view/129/209>.
- Fisher, K., Phelps, R., & Ellis, A. (2000). Group processes online: Teaching collaboration through collaborative processes. *Educational Technology & Society*, 3(3).
- Fisher, M., & Baird, D. E. (2005). Online learning design that fosters student support, self-regulation, and retention. *Campus-Wide Information Systems*, 22(2), 88-107.
- Fraunhofer FIT. (2005). Basic Support for Collaborative Work (BSCW). Retrieved 05/05/06, from <http://bscw.fit.fraunhofer.de/index.html>
- Galliers, R. D., & Land, F. F. (1987). Choosing appropriate information systems research methodologies. *Communications of the ACM*, 30(11), 901-902.
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3), 87-105.
- Goodell, J., & Yusko, B. (2005). Overcoming barriers to student participation in online discussions [Electronic Version]. *Contemporary Issues in Technology and Teacher Education*, 5, 77-92. Retrieved 19/01/2006 from <http://www.citejournal.org/vol5/iss1/currentpractice/article1.cfm>.
- Google Inc. (2006). Writely - The Web word processor. Retrieved 05/05/06, from <http://www.writely.com/>

- Gould, D. (1998). *Leadership in virtual teams*. University of Phoenix, Ann Arbor.
- Grudin, J., & Poltrock, S. E. (1997). Computer-supported cooperative work and groupware. In M. Zelkowitz (Ed.), *Advances in Computers* (Vol. 45, pp. 269-320). Orlando: Academic Press.
- Gunawardena, C. N., & Zittle, F. J. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education*, 11(3), 8-26.
- Gutwin, C., Stark, G., & Greenberg, S. (1995). *Support for workspace awareness in educational groupware*. Paper presented at the Pro ACM Conference on Computer Supported Collaborative Learning, Indiana University, Bloomington, Indiana, USA.
- Guzdial, M., Rick, J., & Kerimbaev, B. (2000). *Recognizing and supporting roles in CSCW*. Paper presented at the ACM Conference on Computer Supported Cooperative Work, Philadelphia, Pennsylvania, United States.
- Hall, T. (1999). *Intelligence Community collaboration baseline study*. Retrieved from http://collaboration.mitre.org/prail/IC_Collaboration_Baseline_Study_Final_Report/toc.htm.
- Handy, C. (1995). Trust and the virtual organization. *Harvard Business Review*, 73(3), 40-50.
- Hao, H. W. (2004). *Students' attitudes toward interaction in online learning: Exploring the relationship between attitudes, learning styles, and course satisfaction*. The University of Texas at Austin.
- Hiltz, S. R., & Benbunan-Fich, R. (1997). *Supporting collaborative learning in asynchronous learning networks*. Paper presented at the Symposium on Virtual Learning Environments and the role of the Teacher, Milton Keynes, England.
- Hiltz, S. R., Coppola, N., Rotter, N., & Turoff, M. (2000). Measuring the importance of collaborative learning for the effectiveness of ALN: A Multi-Measure, Multi-Method Approach [Electronic Version]. *Journal of Asynchronous Learning Networks*, 4. Retrieved 15/03/06 from http://www.alnresearch.org/Data_Files/articles/full_text/le-hiltz.htm.
- Holton, J. A. (2001). Building trust and collaboration in a virtual team. *Team Performance Management*, 7(3/4), 36-47.
- Hughes, S. C., Wickersham, L., Ryan-Jones, D. L., & Smith, S. A. (2002). Overcoming social and psychological barriers to effective on-line collaboration. *Educational Technology & Society*, 5(1), 86-92.
- IBM. (2005). IBM Lotus Notes and Lotus Domino 7 software: the new face of business collaboration and communications. Cambridge, MA: IBM Corporation.
- Jarvenpaa, S. L., & Leidner, D. E. (1999). Communication and trust in global virtual teams. *Organisation Science*, 10(6), 791-815.

- Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, 24(4), 602-611.
- Johnson, P., Heimann, V., & O'Neill, K. (2001). The "wonderland" of virtual teams. *Journal of Workplace Learning*, 13(1), 24-30.
- Kalton, G., Roberts, J., & Holt, D. (1980). The effects of offering a middle response option with opinion questions. *The Statistician*, 29(1), 65-78.
- Kariya, S. (2003). Online education expands and evolves. *IEEE Spectrum*, 40(5), 49-51.
- Kemm, R. E., Williams, N., Kavnoudias, H., Fritze, P., & Weaver, D. (2001). *Collaborative learning: on-campus in a technology based environment*. Paper presented at the Apple University Consortium Conference, Townsville, Queensland.
- Kimble, C., Alexis, B., & Li, F. (2000). Effective virtual teams through communities of practice: Strathclyde Business School Management Science Working Paper No. 2000/9.
- Kirsch-Pinheiro, M., De Lima, J. V., & Borges, M. R. S. (2003). A framework for awareness support in groupware systems. *Computers in Industry*, 52(1), 47-57.
- Knoll, K., & Jarvenpaa, S. L. (1995). *Learning to work in distributed global teams*. Paper presented at the 28th Hawaii International Conference on System Sciences.
- Kreijns, K., Kirschner, P. A., & Jochems, W. (2002). The sociability of computer-supported collaborative learning environments. *Educational Technology & Society*, 5(1).
- Lehtinen, E., Hakkarainen, K., Lipponen, L., Rahikainen, M., & Muukkonen, H. (1999). Computer supported collaborative learning: A review. *The J.H.G.I. Giesbers Reports on Education, Number 10* Retrieved 14/03/06, from <http://etu.utu.fi/papers/clnet/clnetreport.html>
- Lipnack, J., & Stamps, J. (1997). *Virtual teams: Reaching across space time and organisations with technology* (1 ed.). New York: Wiley.
- Lipnack, J., & Stamps, J. (2000). *Virtual teams: People working across boundaries with technology* (2 ed.). New York: Wiley.
- Mandviwalla, M., & Olfman, L. (1994). What do groups need? A proposed set of generic groupware requirements. *ACM Transactions on Computer-Human Interaction*, 1(3), 245-268.
- Mann, B. L. (2005). Testing the validity of the post and vote model of Web-based peer assessment. In D. Williams, S. Howell & M. Hricko (Eds.), *Online Assessment, Measurement and Evaluation: Emerging Practices* (pp. 132-153). Hershey, PA: Idea Group Publishing.

- Markel, S. L. (2001). Technology and education online discussion forums: It's in the response [Electronic Version]. *Online Journal of Distance Learning Administration*, 4. Retrieved 27/01/06 from <http://www.westga.edu/~distance/ojdla/summer42/markel42.html>.
- McGourty, J., Dominick, P., & Reilly, R. R. (1998). *Incorporating student peer review and feedback into the assessment process*. Paper presented at the Frontiers in Education Conference, Tempe, Arizona.
- McLaughlin, P., & Simpson, N. (2004). Peer assessment in first year university: How the students feel. *Studies in Educational Evaluation*, 30(2), 135-149.
- Meyerson, D., Weick, K. E., & Kramer, R. M. (1996). Swift trust and temporary groups. In K. R.M. & T. R. Tyler (Eds.), *Trust in organizations: Frontiers of theory and research* (pp. 166-195). Thousand Oaks, CA: Sage Publications.
- Muirhead, B. (2000). Enhancing social interaction in computer-mediated distance education. *Educational Technology & Society*, 3(4), 1-11.
- Murphy, K. L., Mahoney, S., & Harvell, T. (2000). Role of contracts in enhancing community building in Web. *Educational Technology & Society*, 3(3), 1-18.
- Myers, M. D. (1997). Qualitative research in information systems [Electronic Version]. *MISQ Discovery*, 2. Retrieved 27/05/06 from http://www.misq.org/discovery/MISQD_isworld/.
- Northrup, P. (2001). A framework for designing interactivity into Web-based instruction. *Educational Technology*, 41(2), 31-39.
- Nunamaker, J. F., Dennis, A. R., Valacich, J. S., Vogel, D., & George, J. F. (1991). Electronic meeting systems to support group work. *Communications of the ACM*, 34(7), 40-61.
- Ogata, H., & Yano, Y. (1998). *Supporting awareness for augmenting participation in collaborative learning*. Tokyo, Japan: Ministry of Education, Science, and Culture.
- Oliver, R. (2001). *Assuring the quality of online learning in Australian higher education*. Paper presented at the Moving Online II Conference, Southern Cross University, Lismore.
- Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for the online classroom* (1st ed.). San Francisco: Jossey-Bass Publishers.
- Ragoonaden, K., & Bordeleau, P. (2000). Collaborative learning via the Internet. *Educational Technology & Society*, 3(3), 361-372.
- Rico, R., & Cohen, S. G. (2005). Effects of task interdependence and type of communication on performance in virtual teams. *Journal of Managerial Psychology*, 20(3/4), 261-274.

- Riopelle, K., Gluesing, J., Alcorido, T., Baba, M., Britt, D., McKether, W., et al. (2003). *Context, Task and the evolution of technology use in global virtual teams*: Wayne State University.
- Rovai, A. P. (2001). Classroom community at a distance: A comparative analysis of two ALN-based university programs. *The Internet and Higher Education*, 4(2), 105-118.
- Rovai, A. P. (2002). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *The Internet and Higher Education*, 5(4), 319-332.
- Russo, T. C., & Campbell, S. W. (2004). Perceptions of mediated presence in an asynchronous online course: Interplay of communication behaviors and medium. *Distance Education*, 25(2), 215-232.
- Schlichter, J., Koch, M., & Xu, C. (1998). Awareness – The common link between groupware and communityware. In T. Ishida (Ed.), *Community Computing and Support Systems* (pp. 77–93): Springer Verlag.
- Schwier, R. A., & Balbar, S. (2002). The interplay of content and community in synchronous and asynchronous communication: Virtual communication in a graduate seminar. *Canadian Journal of Learning and Technology*, 28(2).
- Sclater, N., Grierson, H., Ion, W. J., & MacGregor, S. P. (2001). Online collaborative design projects: Overcoming barriers to communication. *The International Journal of Engineering Education*, 17(2), 189-196.
- Scott, G. (2002). Assuring quality for online learning. Retrieved 30/01/06, from <http://www.pqu.uts.edu.au/news/pdfdocuments/QAforOnlineLearning.pdf>
- Sluijsmans, D. M. A., Brand-Gruwel, S., van Merriënboer, J. J. G., & Bastiaens, T. J. (2002). The training of peer assessment skills to promote the development of reflection skills in teacher education. *Studies in Educational Evaluation*, 29(1), 23-42.
- Stacey, E. (1999). Collaborative learning in an online environment. *Journal of Distance Education*, 14(2), 14-33.
- Steckler, A., McLeroy, K. R., Goodman, R. M., Bird, S. T., & McCormick, L. (1992). Toward integrating qualitative and quantitative methods: an introduction. *Health Education Quarterly*, 19(1), 1-8.
- Stohr, V., & Peterson, S. (1999). Virtual teams: A toolkit for OD practitioners, leaders, and team members of virtual teams. Retrieved 06/02/06, from http://www.managementhelp.org/grp_skill/virtual/virtual.htm
- Suler, J. (2004). In class and online: Using discussion boards in teaching. *CyberPsychology & Behavior*, 7(4), 395-401.
- Tellis, W. (1997). Introduction to case study [Electronic Version]. *The Qualitative Report*, 3. Retrieved 19/05/06 from <http://www.nova.edu/ssss/QR/QR3-2/tellis1.html>.

- Topping, K. (1998). Peer assessment between students in colleges and universities. *Review of Educational Research*, 68(3), 249-276.
- Treleaven, L. (2003). Evaluating a communicative model for web mediated collaborative learning and design. *Australian Journal of Educational Technology*, 19(1), 100-117.
- Vonderwell, S. (2003). An examination of asynchronous communication experiences and perspectives of students in an online course: A case study. *The Internet and Higher Education*, 6, 77-90.
- Vygotsky, L. (1962). *Thought and language*. Cambridge, MA: MIT Press.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Whittington, C. D., & Sclater, N. (1998). Building and testing a virtual university. *Computers and Education*, 30(1), 41-47.
- Woolley, D. R. (2006). Collaborative work environments - An independent guide to online collaborative workspaces for virtual teams and e-learning groups. Retrieved 05/05/06, from <http://www.thinkofit.com/webconf/workspaces.htm>
- Yin, R. (1994). *Case study research: Design and methods* (2nd ed.). Beverly Hills, California: Sage Publishing.
- Yin, R. (2002). *Case study research: Design and methods* (3rd ed.). Newbury Park, California: Sage Publishing.

Appendix A - Information Letter to Participants

Information Letter to Participants

This research project is being undertaken by Greg Baatard for a Bachelor of Science (Internet Computing) Honours at Edith Cowan University.

The research is titled:

Evaluating the impact of peer review and participation awareness in an online collaborative document authoring environment.

The research has been approved by the ECU Human Research Ethics Committee.

Description of Research

This research introduces Reportal, an online system to assist small groups collaboratively producing a lengthy document. Such a task is required in this unit, making you eligible to participate in the research if you choose.

The research aims to discover if two certain features of Reportal further support collaboration and ultimately assist group members in producing a better final product. The two features are peer review (commenting on and rating the contributions of other group members) and participation awareness (the display of statistics showing how actively group members are participating).

This research is the first step in identifying features which promote collaboration, and incorporating them into online systems to provide better tools for online group work.

I am asking students to use Reportal to assist them in their group-based document producing assignment. Usage data of the system will be collected over three to four weeks, however students may continue to use the system after this period if they desire. I am also asking students who wish to participate to complete two short questionnaires - one before using the system, and one after the three or four weeks of data collection.

Students are informed that they may opt out of the research at any time, and that participation is entirely voluntary and will have no impact on their grade.

Contact Details

For further information, or any questions regarding the research, contact Greg Baatard at [REDACTED] or on [REDACTED].

You may also contact the supervisor of the research, Dr. Justin Brown, at [REDACTED] or on [REDACTED].

Both the researcher and the supervisor are from the School of Computer and Information Science, in the Faculty of Computing, Health and Science.

If you have concerns about the research and would like to contact an independent person, [REDACTED] can be contacted at [REDACTED] or on [REDACTED].

Confidentiality of Collected Data

All data collected during the research will be stored on a secured computer in a locked room in ECU, and will only be viewed by the researcher and research supervisor.

All collected data will be de-identified to ensure that participants remain completely anonymous. All names will be replaced by generic tags such as "Student 1".

Data collected by Reportal and via questionnaires will be analysed to meet the aims of the research - evaluating the impact of peer review and participation awareness on collaboration.

Usage of Research Results

Results of the research will be published in a thesis, and possibly in an academic conference or journal.

Participants may indicate if they wish to receive a summary of the results by checking the appropriate box in the Student Participation Form.

Thank you very much for your assistance.

Yours sincerely,
Greg Baatard

Appendix B - Informed Consent & Demographics Form

Informed Consent

This form regards the research project is being undertaken by Greg Baatard for a Bachelor of Science (Internet Computing) Honours at Edith Cowan University titled:

Evaluating the impact of peer review and participation awareness in an online collaborative document authoring environment.

The research has been approved by the ECU Human Research Ethics Committee.

Contact Details

For further information, or any questions regarding the research, contact Greg Baatard at [REDACTED] or on [REDACTED].

You may also contact the supervisor of the research, Dr. Justin Brown, at [REDACTED] or on [REDACTED].

Both the researcher and the supervisor are from the School of Computer and Information Science, in the Faculty of Computing, Health and Science.

If you have concerns about the research and would like to contact an independent person, [REDACTED] can be contacted at [REDACTED] or on [REDACTED].

Intent to Participate

You have received an Information Letter describing the aims and procedures of the research. Participants are asked to use the Reportal system to assist them in their collaborative document authoring assignment. Usage data will be gathered over a period of three to four weeks, and short questionnaires will be administered before and after this period.

All information collected will remain confidential and anonymous, and only be used to meet the aims of the research.

If you have any questions regarding the research which have not been answered, please ask the researcher now or contact one of the people listed in this form and the Information Letter.

Students are reminded that participation is entirely voluntary and will have no impact on their grade. Students may opt out of the research at any time.

If you have read and understood all the information provided, and wish to participate in the research, please complete the details on the following page and sign where indicated.

Student Participation Form

FIRST NAME: _____

SURNAME: _____

AGE: Under 21 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ Over 50 ☐

GENDER: Male ☐ Female ☐

EMAIL ADDRESS (student email preferred):

COURSE (e.g. Bachelor of Science, Library Technology):

STUDY LOAD: Full Time ☐ Part Time ☐

STUDY MODE: Internal ☐ External / Online ☐ Mixed ☐

Please check this box if you wish to be advised of the outcomes of this research: ☐

I have read the attached information and wish to participate in the research.

SIGNED: _____ **DATE:** ____/____/____

Appendix C - Email sent to Online Participants

The following email was sent to each group of online participants.

Greetings,

Your group has been registered into Reportal according to the list provided by [REDACTED].

You are group X - To access Reportal, go to:

[REDACTED]

To log in, use your first name (as it appears on [REDACTED]'s list). Your password has been set to the first part of your student email address. As an example, imagine a student named "Sarah Jacqueline Smith", with a student email address of "sjsmith@student.ecu.edu.au" - her login details would be "Sarah" and "sjsmith".

It is recommended that you change your password to something of your own choosing upon logging in. This can be done by going to the Workspace page in Reportal and clicking the "[change password]" link in the Profile section.

The role of group leader was allocated to the first person on the list - The group leader can pass on the role to another group member by going to the Workspace page in Reportal and clicking the "[change leader]" link in the Profile section.

A simple Reportal manual and F.A.Q, as well as my contact email address, can be accessed via the grey links at the bottom of the page in Reportal. Please let me know if you have any questions regarding the system.

To get you started, I'll give a brief overview of how Reportal can be used to complete the first assignment:

The assignment requires you, in groups, to produce a short document with four sections (see your unit materials for assignment details). In Reportal, the group leader can use the Manage Project page to define these sections and assign them amongst the members of the group.

The Workspace page of Reportal allows group members to write up their sections and save them / submit them to the group. Things can be submitted to the group as sections of the main document, or as a Draft / Scrap, allowing group members to view them and provide feedback from the Main page.

When complete, the group leader can export the finished document as a Word document ready for any final formatting, etc, necessary. Reportal aims to keep things organised, centralised and structured, allowing a group to collaborate effectively online.

Hopefully this has cleared a few things up - if you have any further questions, feel free to contact me at this address and I'll do my best to help.

As a final note; if you have not already completed the questionnaire, please find a few moments to do so. It can be found at:



Thank you,
Greg Baatard

Appendix D - Pre-Usage Questionnaire

Internet Experience

The following questions concern your Internet usage and experience.

From where do you have regular access to the Internet?

(check all that apply)

- ☐ Home ☐ Work
☐ University ☐ Other: _____

Approximately how often do you use the Internet during a week?

(include email, browsing, chatting/messaging...)

- ☐ Less than Twice a Week ☐ Several Times a Week
☐ Once a Day ☐ More than Once a Day

I am an experienced Internet user.

- ☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I often use resources on the Internet to support my studies.

- ☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Group Work

The following questions concern your thoughts and experiences with working in small groups (3 to 6 people) to complete assignments in your university studies.

Approximately how many times have you worked in a small group to complete an assignment in your university studies?

- ☐ Never ☐ 1-3 ☐ 4-6 ☐ 7-9 ☐ 10+

When working in small groups, I prefer to be the group leader.

- ☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel that I learn more in assignments requiring small group work compared to those requiring individual work.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Assignments requiring small group work are more appealing than those requiring individual work.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Communication between group members is important in group assignment work.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Strong leadership by a group leader is important in group assignment work.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Equal participation by group members is important in group assignment work.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

In my previous group assignment work, participation was equal amongst all members.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel that I work well in a group.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

What are your primary means of contacting group members when completing a group-based assignment?

(check all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Email | <input type="checkbox"/> Instant Messaging |
| <input type="checkbox"/> Website / Forum | <input type="checkbox"/> Group Work System |
| <input type="checkbox"/> In Person | <input type="checkbox"/> Telephone |
| <input type="checkbox"/> Other: _____ | |

What do you like the most about group assignment work?

What do you like the least about group assignment work?

Group Support Software

The following questions concern your thoughts and experiences regarding software and online systems used to support group assignment work.

Have you used an online learning environment such as Blackboard or eCourse in your university studies?

- ☐ Yes ☐ No

Which of the following group work systems you have used?

(check all that apply)

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Lotus Notes | <input type="checkbox"/> Microsoft Sharepoint / Exchange |
| <input type="checkbox"/> BSCW | <input type="checkbox"/> Yahoo! Groups |
| <input type="checkbox"/> Other: _____ | |

If applicable, please summarise what the system(s) were used for.

Using software or online systems to support group assignment work is essential in order to produce a high-quality outcome.

- ☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

End of Pre-Usage Questionnaire

Appendix E - Post-Usage Questionnaire

Reportal

The following questions concern your thoughts regarding Reportal.

Reportal made working in a group easier to manage.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Reportal made working in a group more enjoyable.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

The design and interface of Reportal allowed me to use the system effectively.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Reportal was well suited to the task of writing a document as a group.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel that Reportal is more useful for groups working primarily online, with little or no face-to-face contact.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel that using Reportal resulted in a better final document compared to previous group work experiences.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Reportal made communicating with my group members easy.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I would like to use Reportal again in future group work.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Which aspects of Reportal did you like the most?

Which aspects of Reportal did you like the least?

How do you feel Reportal could be improved?

Member Awareness Statistics

The following questions concern the member awareness section of Reportal, which displays calculated statistics of individual contribution, participation and activity.

I placed a lot of importance on the member awareness statistics.

- ☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel that the member awareness statistics accurately reflected my own participation in the assignment.

- ☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I found that the member awareness statistics encouraged me to be more active in Reportal.

- ☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I found that the member awareness statistics encouraged me to work harder.

- ☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

The member awareness statistics played a part in shaping my perceptions of other group members.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I found that the member awareness statistics helped the group work together.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel that the member awareness statistics would have a greater impact over a longer period of time.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Overall, I found the member awareness statistics made group work more enjoyable.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Overall, I found the member awareness statistics to have a positive effect on the group.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

What did you like the most about the member awareness statistics?

What did you like the least about the member awareness statistics?

Peer Review

The following questions concern peer review within Reportal, which consists of commenting and rating the contributions of others.

I made an effort to read all contributions of other group members.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I made an effort to post a comment on the contributions of other group members.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I made an effort to rate the contributions of other group members.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I found comments on my contributions to be helpful and constructive.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I revised some of my contributions based on the feedback of group members in Reportal.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I found that peer review helped the group work together.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel that peer review would have a greater impact over a longer period of time.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Overall, I found peer review made group work more enjoyable.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Overall, I found peer review to have a positive effect on the group.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

What did you like the most about the peer review?

What did you like the least about the peer review?

If you have any further comments relating to the research which were not addressed in this questionnaire, please write them here.

End of Post-Usage Questionnaire